The Mining and Metallurgical Journal

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The Mining and Metallurgical Journal

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ISSUED SEMI-MONTHLY

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American and Foreign Coal Exports.

For the first eight months of the year England exported 30.2 million tons of coal, as compared with 28.7 last year; but she received this year $4.05 a ton on the average as compared with only $2.60 in 1899. Our own exports of coal are much smaller than England's, amounting to only 5.3 million tons in the first eight months of the year. This figure, however, represents an increase of about fifty per cent over last year, and all of the signs point to continued expansion. Germany also, another great coal-producing country, has increased its exports largely this year.

It is known that both England and Germany import a good deal of coal, and the question is sometimes asked how these countries can both export and import the same commodity at the same time. A part of the answer is that they do not so handle absolutely the same commodity—that is to say, the imported product is often different in kind from that exported; and another answer may be found in the fact that geographical considerations often explain the apparent absurdity. In our own country, for example, though we are the largest and cheapest producers of coal in the world, we nevertheless import considerable quantities. New England manufacturers under certain conditions find it advantageous to buy coal from the producers at Cape Breton, who can mine it as cheaply as the West Virginia operators and can ship it to New England ports by water more cheaply than the Alleghany producers. In fact, if it were not for the duty, the movement of coal from Cape Breton to the States would assume large proportions.

Sustained Strength of Silver.

While other metals have been falling in value (except copper, which has forgotten how to fall), silver has shown conspicuous strength for several months. In recent weeks the tendency to advance has been more marked than ever and prices have reached a higher range than at any time since March, 1897. Some of the causes of this improvement are temporary, while others will be lastingly effective, and American producers will be interested to learn to what extent their present comparative prosperity may be expected to continue.

One two-fold cause of the recent advance may be found in the military operations around China and the partial stoppage of the import trade in that country. The foreign fleets and armies engaged in the investment of China have required considerable quantities of silver and the various European nations involved have bought silver bars for coinage purposes. The suspension of imports as to a large part of China, while exports have continued in almost normal volume, has occasioned a dearth of exchange and has required the purchasing countries to meet their obligations by shipments of silver. The war in the Transvaal has also had a certain influence, as the English Mint is known to have bought silver freely for currency uses in South Africa.

These three causes, however, while sufficiently effective to warrant attention, are temporary in their nature and much less important than the insistent and increasing demand from India. In that country there is a genuine scarcity of rupees for circulating purposes, and both the Indian Council and the Exchange Banks have been persistent buyers of silver in the London market. Their buying is said to have begun on a large scale several months ago, and to have been so skillfully conducted that even the shrewd and experienced silver operators, who are ever on the watch for a chance like this to make speculative purchases, did not for a long time detect the movement.

While it is thought that the Indian demand has been largely supplied by the enormous quantities already purchased, it is also probable that Indian requirements will be permanently greater than they have been in the past. Next year particularly India is likely to absorb a good deal of silver, as the outlook for crops is excellent and she will probably have a favorable balance of trade to be settled in silver. It is not unlikely, indeed, that India will hereafter buy as much silver per annum on the average as she did before the closing of the mints.

Deadlock in the Iron Trade.

The recent reduction in the price of steel rails to $26 from the fancy figure of $35 in effect for the last twelve months is deemed insufficient by the leading railroads of the country, and they are said to have formed a combination to fight the Steel-Rail Trust—for that is what it amounts to, whatever it may be called. The presidents of the large roads are willing to pay $22 a ton and are now holding out for that figure. Such is the situation at present, and the result is a deadlock in the entire iron trade. More than mere rails is involved in the contest, and large contracts for merchant steel, Bessemer billets, plates, and structural material are tied up pending the outcome of the struggle. Not much has been said about it publicly, but behind the scenes a battle royal is raging.

Whatever price the necessities of the railroads and the strength of the rail combination may ultimately make effective, there is no doubt that $22 a ton would afford the manufacturers a liberal margin of profit. Bessemer pig is openly sold at $13 and billets at $17, and even better prices have been obtained by the favored few. Steel rails and billets should not be far apart if mere manufacturing costs are considered, and it is clear from the price of billets that rails at $22 would give the maker a margin of profit that ought to be satisfactory.

Some of the larger companies are anxious to end the controversy, as they have enormous requirements that cannot be suppressed much longer, and the entire steel and iron trade hope for an early settlement of the difficulty. On every account this is desirable, as the struggle is holding up business in all departments of the industry just at the time when almost every other obstacle to improvement and activity has been settled.

The Anthracite Coal Strike.

As we are going to press (October 13) 857 miners are assembled in convention at Scranton, Penn., invested with the power to end or continue the big anthracite coal miners' strike. Fully 140,000 miners are out on strike, and they are practically unanimous in supporting President Mitchell's demand that the union shall be recognized in the future dealings between the operating companies and their men. Offers of ten per cent increase in wages and of a reduction in the price of powder have gone a long way towards hastening a settlement of the big contest. The concession of the employers is considered liberal in most quarters, but the men seem disposed to stand out for the formal recognition of their union as a condition to an immediate ending of the strike.

Further demands for concessions on the part of the miners are likely to be met by the operators with a declaration that they have reached the limit of their willingness to concede. Meanwhile, Senator Hanna, who is generally thought to be influential with the operators, is expressing confidence that a mutually satisfactory settlement is near at hand.

American Machinery at Paris.

An Exhibit that Won Three Prizes—The Machines that Took the Honors—Three Prize Coal-Cutters and the Work They Can Do.

It is with considerable pleasure that we present in this issue a description of one of the American exhibits at Paris which has brought to this country much of the renown it has acquired through its displays in the big Exposition. It seems that American mining men and American manufacturers of mining machinery have especial grounds for satisfaction over the Paris awards. Where prizes were won by American exhibitors in this class the competition was in most cases very keen, and the points on which the awards were made were very closely contested.

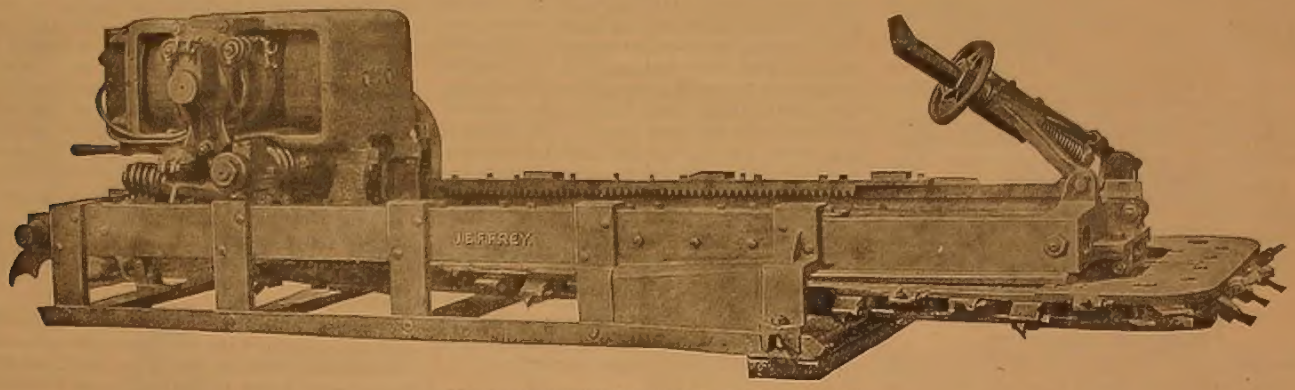

FIG. I.—ELECTRIC CHAIN COAL MINING MACHINE.

No house was more successful in carrying away honors than the Jeffrey Manufacturing Co. of Columbus, O. One gold medal, one silver medal and one bronze medal were won by this company, and it was announced that if the firm had ever before exhibited in France it would have secured a Grand Prix. It is a custom at Paris expositions that first exhibitors are not eligible for the Grand Prix. The Jeffrey company exhibited in competition with all English, German and French manufacturers of coal mining machinery. The design of the machinery, the excellence of manufacture and the method of operating were the points chiefly considered in making the awards, and it is only natural that the successful house should feel most gratified over its honors. This gratification, we are confident, will be shared by hundreds of American mining men who know of the Jeffrey products from their practical experience.

Through the courtesy of the manufacturers we present herewith the illustrations of the machines that brought the coveted prizes to America. It was the coal-cutters of the Jeffrey company that seemed to possess the greatest attraction for the judges.

Figure I. shows one of these—an electric chain coal mining machine built to meet general conditions and designed especially to withstand the heavy work required in mining where the cutting is very hard and much power required. The machine is designed for under-cutting in coal to three different depths, according to the thickness of the vein—five, six or seven feet, and in width thirty-nine or forty-four inches. The motors are direct current and are wound for either 220 or 500 volts. It requires from three and one-half to four minutes for one of these machines to make its cut in under the coal the full depth and width and back out. The machine can be handled by one machine runner and one helper, and is capable of cutting from 100 to 300 lineal feet face a day.

Figure II. shows another electric chain machine for coal mining. This machine is built in two sizes to under-cut to a depth of five or six feet, forty-four inches wide. A full cut can be made and the machine backed out in three and one-half or four minutes. The cost of mining coal in veins from forty-four inches to thirty-six inches in thickness has been excessive. The makers of this machine recognized the demand for a reduction in this cost and saw that the reduction would have to be made by the use of some mechanical means for under-cutting the coal. They saw also that the cost of production depends, in thin veins more than in thick ones, upon the rapidity with which a machine can be moved about so that it may be kept in operation continuously. With this idea in view, this machine has been built low, compact and light, in order to insure maximum cutting.

Another Jeffrey coal-cutter is shown in Figure III.—an air chain coal mining machine. It is built in three sizes to under-cut to a depth of five, six or seven feet, either thirty-nine or forty-four inches wide. To make the full cut under the coal and back out again requires from three and one-half to four minutes. It is well adapted for use in both thick and thin veins of coal and embodies most of the features of the electric machines, with the exception of the method of applying power. The engines are especially designed for heavy duty, and the machine has found a wide application in mines where the cutting is very hard. Its use is quite general in mines formerly operating what is commonly known as the "pick" or "pincher" machines, and the adoption of the air chain machines in such mines is said to be increasing rapidly.

Sharing the attention of the coal-cutters in the Jeffrey exhibit were two mining drills, one an electric drill and the other a giant air drill. The former is shown in Figure IV. This drill is capable of making a hole six feet deep in coal in less than one minute. The drill completed weighs about 150 pounds when fitted with a frame for a six-foot vein of coal. Machinery of this kind is naturally subjected to extremely rough use and the design and construction of this drill have been carried out with this point well in mind. Although strong and rigid, it can be easily handled by two men or by a man and a boy.

The giant compressed air drill is shown in Figure V. This machine can make a six-foot hole in less than one minute. When fitted with a frame for a six-foot vein it weighs about 140 pounds.

One more feature of the Jeffrey exhibit was the electric locomotive of the Gondola style shown in Figure VI. This locomotive weighs about 14,000 pounds. It is equipped with two 25-HP. motors, which are thoroughly dust-proof and water-proof. It has a capacity for hauling a gross load of sixty-six tons at eight miles an hour, on the level; on a one per cent grade, thirty-seven tons; on a two per cent grade, twenty-four and one-half tons; on a three per cent grade, seventeen and one-half tons; and on a four per cent grade, thirteen tons. The machine exhibited has a place for the operator on the end of the locomotive and is for this reason known as the Gondola style. Another style of the same machine has the operator's seat in the center between the two motors.

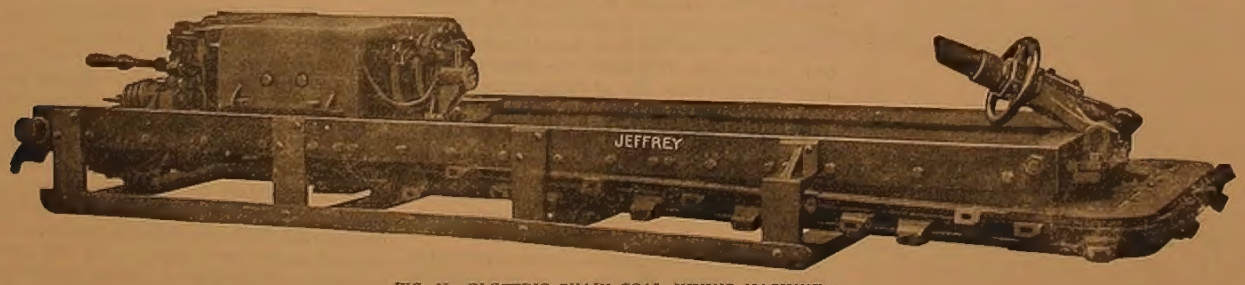

FIG. II.—ELECTRIC CHAIN COAL MINING MACHINE.

Characteristics of California Petroleum.

Physical and Chemical Features—How the Products of Various Fields Differ — Petroleum *vs.* Coal as a Fuel.

By A. S. Cooper, State Mineralogist of California.

Petroleum oils from different oil fields of California differ widely in physical characteristics and chemical composition. They may contain chemically combined one, two, or all three of the following elements—sulphur, oxygen and nitrogen—and in widely varying amounts, while in some rare instances these elements may be absent. Oils in the same stratum and a short distance apart may vary greatly. Frequently a well when it first yields will give an oil of a lighter gravity than that which it will yield when it has been pumped for some time. We may, therefore, look upon California petroleum as containing the following substances in an unknown state or states of combination: Carbon, hydrogen, sulphur, oxygen, nitrogen and other substances in minute quantities; these combinations being very great in number and extremely complex.

The boiling points and melting points of the bitumens are altered very considerably by the presence of, or even by the traces of sulphur, oxy-

gen and nitrogen. The presence of a greater or less amount of these substances during distillation has an influence on the distillate. Generally the larger the amount of carbon, sulphur, oxygen or nitrogen an oil contains the greater its specific gravity, boiling and melting points.

CHEMICAL COMPOSITION.

California petroleum is a mixture of a large number of hydro-carbons, and a large number of compounds containing hydro-carbons combined wit.. sulphur, oxygen and nitrogen and other elements. The sulphur compounds usually predominate, followed by oxygen, then nitrogen, and last the other elements in smaller quantities. These sulphur, oxygen and nitrogen compounds were formed at the time that the oil was distilled from carbonaceous rocks by the heat of metamorphism, or are substitution compounds formed subsequent to such distillation by the hydro-carbons coming in contact with these substances under different conditions. Oil when exposed to the air absorbs oxygen; when heated with the peroxides, the peroxides are reduced to a lower state of oxidation. Petroleum, when exposed to sulphur vapors, absorb them; when heated with the persulphides, the persulphides are reduced to a lower state of sulphuration. From this it can be seen that California petroleum is of a highly complex character, containing a large number of hydro-carbons and hydro-carbon derivatives. When the sulphur, oxygen, nitrogen and other elements are removed a number of the remaining hydro-carbons must be unsaturated, and unless these substances be removed from the crude oil before distillation, fractional distillation does not give a true index to the composition of the oil. Ultimate analysis is worthless to show the character of the oil.

All the hydro-carbons and their compounds with other elements in California crude petroleum are volatile. Some, such as benzine, are extremely volatile, whereas asphaltum volatilizes with great slowness. Natural gas is a volatile part of petroleum. Like coal, the bitumens, oils and asphaltum through decomposition are constantly giving off carbureted hydrogen. This decomposition is probably effected by acids, alkalies and other oxidizing agents forming oxygen compounds with the bitumens, and liberating carbureted hydrogen.

The composition may also be effected by sulphurizing agents forming sulphur compounds with the bitumens and liberating carbureted and sulphureted hydrogen. These oxidizing and sulphurizing agents are formed by metamorphism and other chemical reaction within the earth, which came in contact with the bitumens. Carbureted hydrogen may also be generated from oil by heat; this gas is often found issuing from vents in the ground in California, having a temperature higher than the surrounding ground—sometimes as high as 90° Fahr. One of the reasons that California petroleum oils have such a high gravity is the fact that the formation in which they occur is tilted and broken, permitting the escape of the gases.

FORMATION OF ASPHALTUM.

When California petroleum is evaporated by atmospheric influences, the sulphur, oxygen and nitrogen compounds remain and are concentrated, and if the process is continued long enough, solid asphaltum is formed. After asphaltum is formed, evaporation proceeds with exceeding slowness. Heat accelerates evaporation. The evaporation from an oil tank built under ground and kept at a temperature of 60° Fahr. is far less than from a tank built above the ground and exposed to the sun's rays, which may often reach a temperature of 130° Fahr. If a petroleum oil having a specific gravity of 40° Beaume be exposed to the heat of the sun in a shallow pan, it will decrease twenty per cent in volume in a short time; the portion of oil evaporated being better for the manufacture o. gas than the part remaining in the pan. This experiment is easily tried and very convincing.

Notwithstanding this evaporation caused by high atmospheric temperature, the oil producer stores his oil in dark-colored tanks, which are exposed to the blistering heat of the sun, and it is to be regretted his example in many instances is followed by the gas manufacturer. If the oil tank cannot be placed underground where the temperature is low and fairly constant, it should at least be shaded from the sun and whitewashed to decrease absorption of heat.

When a fresh supply of oil is emptied into a tank which contains oil that has been stored for some time, it should be introduced into the bottom of the tank; the fresh oil being lighter than the oil already in the tank has a tendency to ascend, and in doing so it dissolves the heavy oil, and will not evaporate so rapidly as it would if it was placed on the surface of the heavy oil.

Advantage is taken of the fact that asphaltum is nearly an unalterable gum, to make many constructions in which a plastic and unalterable cement is required. Usually, California asphaltum contains from five to nine per cent. of sulphur.

Some wells in California produce oils containing paraffin, but they are so valuable for producing illuminating oil that their use for gas-making is prohibited. At Baku, in Russia, a tract of land less than twenty acres in area has produced in twelve years 35,000,000 barrels of oil, and is still producing about 12,000 barrels a day.

SMALL TERRITORIES AS BIG PRODUCERS.

On the Laguna Extension, or Zaca rancho, in Santa Barbara county, California, there are large deposits of bituminized sand exposed upon the surface. On any one of several twenty-acre tracts at this place the dimensions of the exposures of the bituminized sand would show that it contains eight million barrels of heavy petroleum of the consistency of molasses. To make one barrel of that material, it must have taken eight barrels of ordinary petroleum before evaporation, so that on each twenty-acre tract are now the remains of 64,000,000 barrels of petroleum oil. The astonishing part of this is that it is seen upon the surface and is not hidden beneath. Therefore, in California, as well as in Russia, there are probabilities of a very small territory producing immense quantities of petroleum oils. The case cited shows at least one such place, and there may be, and doubtless are, many others of similar character, where the oils are still hidden.

Unaltered rocks of California cover an area of over forty thousand square miles. Bitumens occur in all geological formations from the plutonic, metamorphic or igneous rocks up to and including the quaternary. It is found saturating strata of sand and seamed shale, and as many as ten beds of shale can be seen on the eroded sides of some of the anticlinal ridges of the Coast Range. These sand beds are very irregular as regards their thickness and the distances between them. Some are a few feet in thickness, while others exceed four hundred feet, and the shales are from a few feet to over five hundred feet in thickness.

When several sands are to be seen on the side of a mountain, or when they can be traced upon the surface of the earth by their outcrop, if bituminized at all, the bitumen will generally be in the geologically lower beds, and when a sand contains bitumen, the underlying sand beds are also liable to contain bitumen.

FIG. III.—AIR CHAIN COAL MINING MACHINE.

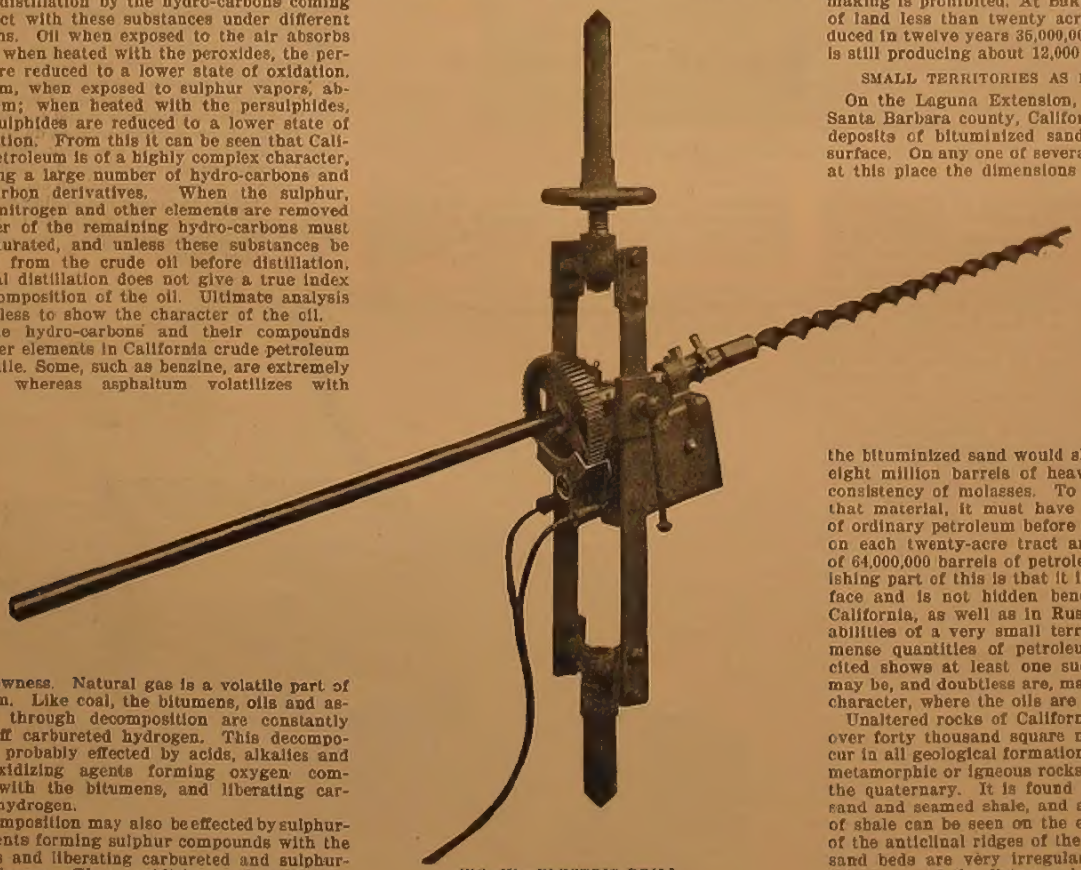

FIG. IV.—ELECTRIC DRILL.

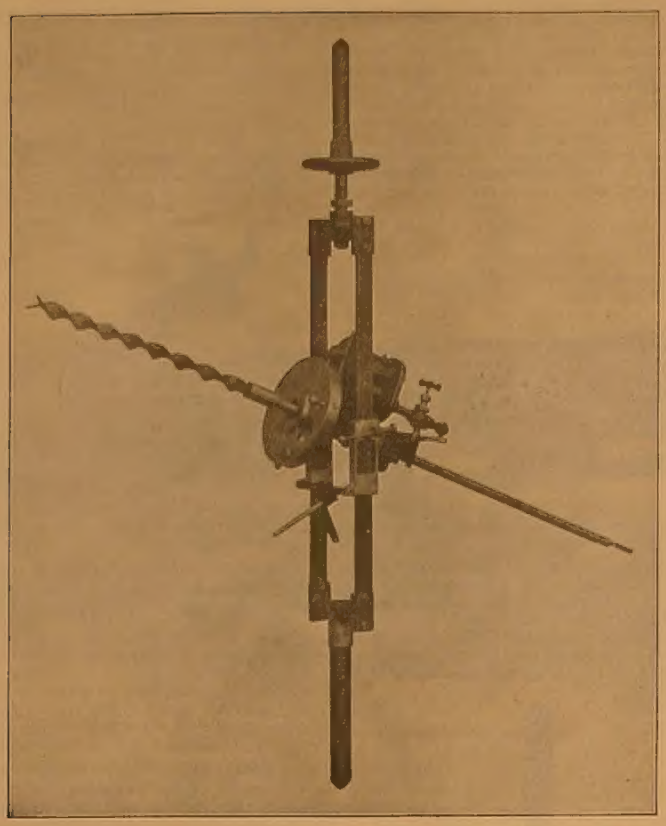

FIG. V.—"GIANT" COMPRESSED AIR DRILL.

At the present time, nearly all the wells that are being bored are in the vicinity of surface indications, to wit: Oil seepages, outcrops of bituminous rock and gas blow-holes, all of which are signs that the reservoirs of petroleum are leaking, owing to insufficient cover. At present, the wells are generally shallow, but they will increase in depth in time as they have done in other oil fields. The day is not far distant when oil territory will be selected by geologists on account of favorable structure and position, irrespective of surface bitumens. The wells in this territory will have to be drilled to greater depths, but when productive will yield light oil. Owing to the large area and the thickness of the unaltered rocks and the great thickness and the number of oil sands in California, the yield of oil in California in future years will be enormous.

PETROLEUM'S ADVANTAGES AS A FUEL.

A comparison of the consumption of fuel oil with that of coal shows 3.33 barrels of fuel oil to be equivalent to one ton of good imported coal Figuring oil at $1.40 a barrel and coal at $7.50 a ton in San Francisco, it shows the cost of oil to be $4.66 as against $7.50 for its equivalent in coal Moreover, the labor required to operate with coal is far greater than with oil, in most instances being nearly double.

The perfect cleanliness of fuel oil and the ease and simplicity of supply and regulation makes it a most desirable substitute for coal. As long as coal remains at $7.50 a ton in California, it cannot be expected that oil will fall below its present price; not at least for some time to come. In the year 1899 there were 1,740,027 tons of coal imported into the state of California; to supplant this, 5,792,278 barrels of oil will be required. As the supply becomes more permanent, the uses of fuel oil will multiply.

The removal of the gasoline, benzine and illuminating oil, leaves an oil with a high-flashing point, which would be less dangerous to use in a locomotive and otherwise than a fuel oil of low flashing point. The removal of the water also improves the oil for fuel purposes, as it does not have to be evaporated by the fire.

The asphalts in the crude oil are objectionable for the manufacture of gas. When the asphalts are subjected to the temperature necessary to gassify the oil, sulphurous gases are formed (principally sulphurated hydrogen), and as the asphalts contain a large percentage of sulphur, these gases are formed in quantity and require a large amount of a purifier for their removal. The presence of asphaltum also fouls the chequer bricks in the superheater and carbureter in making water gas, and the retorts in making oil gas.

At present, the market value of asphaltum is too high for it to be economically used for either the manufacture of gas or for fuel purposes. The large percentage of sulphur in natural asphaltum or in those obtained as a residue in the distillation of crude petroleum, make them an undesirable fuel. During combustion with oxygen the sulphur combines with the oxygen to form sulphur dioxide. Sulphur dioxide in absorbing water or the vapor of water, changes to sulphurous acid. By oxidation the sulphurous acid is changed to sulphuric acid, which may lodge on the surface of the boiler and attack the iron, forming sulphate of iron. Through this action the sulphur contained in the asphalt is a cause of corrosion in boilers. Owing to the presence of sulphur, the fuel value of asphaltum is small when compared with the other hydro-carbons contained in crude oil.

DISTILLATES TO REPLACE CRUDE OIL.

The time is not very distant when crude California oil will not be used for the manufacture of gas. Distillates will be substituted for crude oil for the reasons given in this paper; therefore, it will be of interest to know what action distillation will have upon the crude California oils. In Pennsylvania the upper half of the still is left exposed to the air to facilitate decomposition. During the first distillation of crude California petroleum oil, decomposition of any part of the oil should be avoided; consequently the still should be completely bricked in so that the vapors will be kept fully heated until they escape the condenser.

In the manner of cracking as practiced in Pennsylvania, there must be a great loss of heat from the exposed surface of the still. The laboratory and practice show that the distilling, manipulating and purifying of crude California oil must be totally different from the methods in use in Pennsylvania, Canada, and elsewhere. Most of the crude California oils should be distilled twice. From experiments made, it would appear that the vapors of the lower hydro-carbons during distillation are contaminated by the decomposition of the sulphur compounds contained in the higher hydro-carbons, such decompositions being caused by heat. Usually the higher the boiling point a distillate contained during any one run of a still, the greater the amount of sulphur compounds contained in the same.

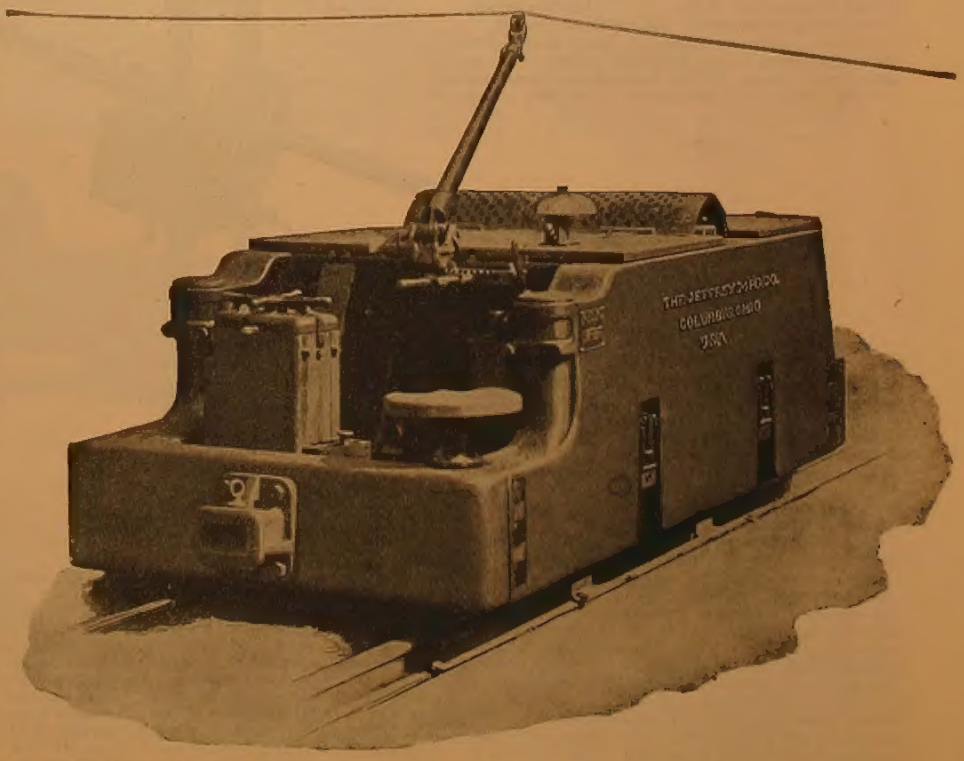

FIG. VI.—ELECTRIC LOCOMOTIVE, GONDOLA STYLE.

DISTILLATION OF SULPHUROUS OILS.

In distilling oils containing sulphur, the main body of the sulphur compounds remain in the higher hydro-carbons. Owing to this action, by repeated distillation, the sulphur compounds are generally eliminated to a great extent, but hardly ever completely from the oil.

A distillate having a certain specific gravity when distilled under atmospheric pressure from crude petroleum may contain sulphur in notable quantity; whereas a distillate of the same specific gravity when distilled from the same crude petroleum in vacua may be comparatively free from sulphur. This is probably owing to the fact that a greater temperature is required to vaporize the oil when under atmospheric pressure than in vacua, this additional heat decomposing the sulphur compounds.

At ordinary temperatures, petroleum oil does not absorb sulphureted hydrogen when collected on the surface of the oil. If hydrogen at a high temperature or in a nascent condition is introduced into the vapors of the light hydro-carbons during distillation, the sulphur vapors which are formed by the decomposition of the sulphur compounds contained in the lighter hydro-carbons, combine with the hydrogen and can be carried from the still. But if the hydrogen is omitted, the sulphur from the decomposition of the sulphur compounds combines with the hydro-carbons to form complex sulphur compounds, which are removed with difficulty. It is supposed that when in a crude state and not distilled, the lower hydro-carbons in the California petroleum do not contain sulphur compounds to any marked extent, but are sulphurized during distillation by the decomposition of the sulphur compounds contained in the higher compounds.

The asphalts obtained by the distillation of California petroleum contain from four to seven per cent of sulphur. Vapors of sulphur have a greater affinity for heated hydrogen forming sulphureted hydrogen than for heated hydro-carbon vapors to form sulphur compounds. When hydrogen is in a nascent condition, it will replace sulphur in the liquid compounds of sulphur and hydro-carbons by inverse substitution. The activity of this action is increased by heat. At 60° Fahr. the action is very feeble, but at 200° Fahr. the action is rapid, and at higher heats the action is still more rapid.

CLASSIFICATION OF COMPOUNDS

As has been stated, California crude petroleum is composed of a number of hydro-carbons and hydro-carbon compounds mutually dissolved one within the other, and having different boiling points. Owing to this they can be fractionally distilled so as to separate them into fractions having the following commercial names and physical characteristics:

The following are the percentages of the distillates contained by the first distillation from many crude California oils:

Naphtha	traces	15 per cent
Illuminating	6.00	27 per cent
Gas Distillate	16.00	30 per cent
Lubricating	20.00	52 per cent
Asphalt and loss	7.00	25 per cent

In the first distillation the following are the temperatures at which the following distillates are distilled:

Crude Naphtha	to 150°C.
Illuminating Distillate	150° to 300°C.
Gas Distillate	300° to 350°C.
Lubricating	350°

Owing to the highly complex composition and great diversity of California oils, the above figures are to be considered only as suggestive.

Crude California Oil 26 B Distillates Commercial name.	Gravity — Approximate, Beaume	Gravity — Specific Gravity.	Weight of 1 gallon in lbs.	Percentage obtained approximate
Gasoline	75	0.6820	5.69	3
Benzine	63	0.7253	6.04	4
Illuminating	45	0.8000	6.66	13
Mineral Sperm.	38	0.8333	6.94	8
Gas Distillate	28	0.8850	7.38	11
Light Lubricating	26	0.8974	7.48	8
Neutral	23	0.9150	7.62	10
Heavy Lubricating	21	0.9271	7.72	5
Valve Lubricating	15	0.9655	8.04	4
Asphalt	..	.....	....	11
Loss	..	.....	....	13
Total	..	.....	....	100

The Robins Belt Awards.

We present herewith an illustration of the Robins Conveying Belt Co.'s exhibit at the Vincennes machinery annex of the Paris Exposition. The exhibit shown secured for the company a Grand Prix, the only one awarded to any exhibitor of conveying machinery at Paris. The display shown consisted of a twenty-inch Robins belt conveyor ninety feet in length and running level under a series of bins. The conveyor, after clearing the bins takes a curved incline, raising the material to a height of seven feet, whence it is delivered to a horizontal twenty-inch conveyor which in turn carries it in the reverse direction. A patent tripper operates on the upper line of conveyor, distributing the material into the bins and reversing automatically at each end of the bins without the assistance of an operator. This system has a capacity of 200 tons an hour, and during the exposition it was constantly in operation handling broken stone.

Other exhibits of equal merit were made by the Robins company at Paris. One of these was in the machinery and electricity building and consisted of two twenty-inch conveyors thirty-five feet in length. The other exhibit was in the mining building, where there was shown a one-quarter size model of the Vincennes exhibit, including the automatic trippers. Both of the latter named displays were also in constant operation. Besides its machinery, the company displayed a large collection of photographs of its belt conveyors, showing installations in every country in the world where mining is carried on. The crowds examined the photographs with great interest, but it was the conveyors themselves that attracted most attention, especially those on which the automatically reversing trippers were in operation. This was the first exhibition of this invention in Europe. The regularity and smoothness of its working and its economical operation won for it the favorable decision of the judges as well as the admiration of the spectators. The Robins Conveying Belt Co. still has on hand at its New York offices in the Park Row Building a small number of catalogues attractively gotten up in French and English, which were prepared for distribution at the exhibits.

THE ROBINS CONVEYING BELT CO.'S DISPLAY AT VINCENNES.

The Properties of Brass Made from Copper Containing Sub-Oxide.

By Erwin S. Sperry, Bridgeport, Conn.

The oxidation of metals melted in contact with air takes place with dissimilar results. Tin, lead or zinc are examples of a class, the oxides of which float on the surface of the melted metal. First a film is produced, which covers the surface; then, if agitation from any cause exposes new metal to the action of the air, additional oxidation takes place, and the film is increased in volume. This change goes on until a considerable quantity of oxide (or "dross," as it is technically called) is formed; depending, of course, upon the duration of the exposure of the metal to the atmosphere. When such metals are poured, the dross may be skimmed off; and clean metal will be left underneath. The removal of such oxides is, therefore, merely a mechanical process. In the case of copper, however, the result is quite different. The sub-oxide of copper (Cu_2O) is readily

soluble in molten copper; and therefore, instead of the formation of a film of oxide, to be finally removed as dross, the surface of the metal remains bright and clear, because the oxide has been dissolved as soon as it was produced.

It is customary in the process of copper-refining to leave a small quantity of oxide in the metal, in order to oxidize any traces of bismuth, arsenic or antimony which have not been entirely removed. As a result, these metals exist in the commercial product as oxides, and not as metals, which would form an alloy with the copper and so injure its quality. In making copper bars for the manufacture of wire of high electrical conductivity, and cakes to be rolled into sheet, this practice is, without doubt, beneficial; but it does not improve the copper for the manufacture of brass or other alloys. Zinc is a strong reducing agent; and the study of its thermo-chemical reactions has shown that it will reduce not only the oxide of copper according to the reaction

$$Cu_2O + Zn = 2Cu + ZnO.$$

but the oxides of bismuth, arsenic and antimony as well. In the manufacture of brass, therefore, all the other metallic oxides are reduced to metal, with the formation of oxide of zinc.

It is well known that, by reason of the absorption of oxygen, copper rapidly deteriorates when melted in a crucible. Each successive melting, therefore, injures its quality. Small amounts of oxygen do not seem to affect appreciably the "hot-working" qualities of copper, but tend to make the metal cold-short. In the manufacture of sheet-copper the tendency to crack during the process of rolling is overcome by reason of the fact that the metal is "broken-down" hot; the cold-working which is afterward put upon it does not then have the tendency to crack it. Pure copper is much softer than that which contains oxygen.

In order to determine the influence of sub-oxide of copper on brass, it was necessary to make copper containing varying quantities of sub-oxide, and then to use these products instead of the pure material. It was decided to introduce into the copper the maximum amount of sub-oxide, and to use this product, first without any admixture of pure material, and then with the addition of varying amounts of pure copper, thereby decreasing the percentage of contained oxygen. The ideal method, however, seemed to be to melt pure copper in a crucible, and then add some oxidizing agent like saltpeter. Such a method was also tried.

It is believed that the experiments thus made demonstrate that oxygen in copper, unless present in abnormally large amounts, does not exert a deleterious influence on the quality of brass intended for rolling into sheet. If oxygen is present in excessive amounts (quantities seldom occurring in practice unless the melter is lax in his methods), salamanders are apt to form. If it is present in less amount, salamanders may not form, but the brass manifests a tendency to crack in rolling. This is due, no doubt, to the zinc oxide present, which prevents perfect cohesion. From still smaller quantities of oxygen, practically no injury is noticed. The proportion may even be as high as 0.65 per cent and no adverse results happen; but more than ordinary care must be exercised to keep the metal thoroughly covered with charcoal.

The amount of oxygen in commercial copper is more or less variable, depending upon the caprices of the refiner; but in the best brands great care is taken to keep within as narrow limits as possible. The pitch, of course, determines this point.

According to advices received in personal communications from chemists representing two leading brands of copper on the market (one Lake and the other Electrolytic), the amount of oxygen which exists in these brands of copper may be taken as follows:

	Lake. Per cent.	Electrolytic. Per cent.
Oxygen Contained in Ingot Copper.....	0.012	0.010

On a careful perusal of the results of the various experiments referred to, it may be readily seen that no injurious influence can possibly be exerted by such a small proportion of oxygen as 0.01 per cent. Good sheet-brass was made from copper containing over fifty times this quantity. Although the initial amount of oxygen in copper may be quite minute, and not sufficient to exert any influence on brass, yet if the caster is not cautious, and neglects the frequent additions of charcoal, this small percentage may be increased many times by the oxidizing influence of the atmosphere.

In conclusion it may be said that, unless the amount of oxygen in commercial copper exceeds the figure given above, it cannot, *per se*, be called an injurious impurity.*

Water Power in the Snake River District.

A Suggested Hydraulic Pumping Plant for Power, Irrigation and the Treatment of Gold Sands.

By John Birkinbine, Philadelphia, Pa.

The following data, collected during a visit to the Snake river district, in Idaho, are offered as indicating the possible utilization of a waterfall for irrigation by pumping, the working of gold placers, the generation of electricity for light and power, and possibly for manufacturing purposes. For irrigation and placer washing, a portion of the water is applied to wheels and pumps to elevate another portion. These notes do not describe any new methods in hydraulics, in electrical development, in irrigation or in hydraulicking auriferous sands, but rather suggest the possibility of various applications of the water power available, either contemporaneously or in different seasons.

As the minimum flow in the Snake river is in the winter, when the snows on the mountains are not melting, while the normal or possible flood-flow is during the season when irrigation is necessary, the application of water for other purposes may possibly alternate with irrigation. The Snake river heads on the continental divide, close to the Yellowstone Park in the state of Wyoming, and flows southwestward through eastern Idaho, then westward, and then northward, forming a portion of the boundary between Idaho, Oregon and Washington, and finally uniting with the Columbia river in the latter state. The three prominent falls on the stream, after it has obtained considerable volume, are the Idaho, the American and the Shoshone falls, the latter being the most noted. The data here given concern the conditions at the American falls, the point where the Oregon Short Line railroad crosses the Snake river, twenty-six miles west of Pocatello, Idaho.

The Snake river has here a width of 750 feet, and a break in a lava-flow forms a series of cascades (the American falls) having a drop at low water of 39.8 feet. As the volume of the flow increases, the difference between the water levels below and above the falls is somewhat reduced; but from the information obtainable the tail water will not rise more than 1.5 feet for each foot of increased height in the level of the head-water; and the additional volume of water will more than compensate for the reduced head. It is therefore safe to base estimates of power upon the flow and the fall at low water stage.

The drainage basin of the Snake river, above the American falls, approximates 22,000 square miles—equal to one-half the area of the state of Pennsylvania. Mr. F. H. Newell, hydrographer of the United States Geological Survey, records stream measurements made at two points upon the Snake river, one above and one below the American falls.

At the Idaho falls (seventy miles above the American falls), with a drainage area of 10,000 square miles, the minimum discharge of the Snake river was found to be 2,000 cubic feet per second in 1890, and 2,250 cubic feet per second in 1892, approximating 0.2 cubic feet per second per square mile of drainage area. The elevation of the Idaho falls is 4,710 feet, and that of the American falls is 4,341 feet, above sea level. At Montgomery ferry, twenty-five miles below the American falls, with a drainage area of 22,600 square miles, the minimum flow was reported as 4,420 cubic feet. At each of these stations the flood-flow exceeds 50,000 cubic feet per second. Owing to the superposition of lava benches one upon another, some of the water, following the planes of juncture, appears in numerous large springs, at intervals along the shores of the river, thus affecting estimates of the flow based upon the drainage area. The investigations made, however, indicate that a minimum flow of over 4,100 cubic feet per second can be depended upon; and that with good water wheels, properly installed, about 13,000 horse-power can be developed at the American falls with the average low water discharge.

The locality permits the erection of a power plant, at small expense, on either side of the river below the railroad bridge. It is possible, with water rights granted on both shores of the river, that more satisfactory results may be obtained by dividing the plant, especially for irrigation purposes; that is, by installing part on the east side of the river and part on the west side; or it may be preferable to connect the eastern shore with a rocky island which divides the river, or to convey electrical energy across the stream by wire.

The fall, being an ordinary one, will require no special form of water wheels, of pumps, or of electric generators. Hence any development will be relieved from unusual expenditures for equipment, and it will be possible to follow an initial installation capable of meeting immediate requirements by others, as augmented power is demanded, without proportionately increased cost.

A properly designed plant will raise one cubic foot of water to the plateau for every five cubic feet applied to the wheels at the American falls; and if a lower lift be found desirable, for placer washings, etc., the proportion of water consumed in this way will be smaller.

IRRIGATION

The great stretch of sage brush plain in southeastern Idaho, composed largely of decomposed lava, produces, under irrigation, crops of wheat, alfalfa, potatoes, turnips, etc.; and the hardier fruits yield satisfactorily. Large expenditures upon canals and ditches in northern Utah and in Idaho, and the crops obtained from watered lands, testify to the local appreciation of irrigation. The existing installations for irrigation, with few exceptions, withdraw water from the rivers by long feeder canals, which supply the main and lateral irrigation ditches.

The territory on the west side of the Snake at the American falls rises quite abruptly to a mesa, or plateau, about 100 feet above the water level. The eastern side, although ascending more gradually, is cut by draws or ravines, and possesses a more uneven topography. The average descent of the Snake river is about six feet per mile, and as a feeder ditch requires a fall approximating one foot per mile, a main canal twenty miles long would be required to bring water to this plateau, 100 feet above river level.

To avoid this expense an experimental pumping plant was erected, consisting of two twenty-three-inch horizontal turbine wheels, belted to two thirty-two-inch centrifugal pumps, having a guaranteed combined capacity of delivering 750 cubic feet of water per minute to the main ditch 104 feet above the river. The wheels, however, utilize but three-fourths of the available fall. The guaranteed capacity of the wheels and pumps as installed (750 cubic feet per minute) will irrigate 1,000 acres.

AURIFEROUS SANDS.

The existence of free gold in large quantity, but generally finely comminuted (much of it being float-gold), is well known, and the Snake river is actively exploited by dredges and ground-sluicing. The most desirable deposits of auriferous sands are either above the river level, and therefore unworkable, except by hand labor or by water artificially elevated, or are in bars in the bed of the stream, from which the sand and the water for washing it must be raised by mechanical power.

Close to the American falls the territory adjoining the shores is worked at a number of places, the material being handled by scrapers drawn by horses, and treated in crude ground sluices with satisfactory results. Samples of the concentrates were obtained, and also samples, take over the area excavated, were panned out, showing numerous "colors."

The present operations are confined to bars, or to localities where the stripping is slight, because the material must be handled by animal labor or by steam dredges, which latter must pay from $4 to $6 per ton of coal, delivered at the dredges. It is reported that sixty dredges are at work on the Snake river.

Electric power developed at the American falls may possibly be conveyed to operate dredges at other points on the river, at rates which, while profitable to the generating company, will permit a reduction in the cost of operating the dredges.

With water delivered to the top of the banks, and used through pipes and nozzles, this territory yields more gold at smaller cost per ounce.

*Extract from paper read at Canadian meeting of American Institute of Mining Engineers. The complete paper describes minutely fourteen experiments on which the conclusions stated are based.—Editor.

Three sluice-heads of water, supplied by the 750 cubic feet per minute furnished by the present plant, should each wash at least 500 cubic yards per day when in operation; i. e., they will move 1,500 cubic yards per twenty-four hours, and twenty-six cubic feet of water will therefore be required per cubic foot of material washed. But even if a more liberal supply of water must be pumped, this will permit the moving of the material to sluices at a cost below that required for dredging, and much below that which prevails at the active ground-sluicing operations.

The project is to use the irrigation ditches for conveying water to the gold diggings; but it may be found advantageous to attack some of the auriferous sands with water which need not be elevated as high as for the ditches; and greater service can thus be secured from a given river volume, applied as power to pump the water for washing. If, however, gold washing is carried on as an adjunct to an irrigation system as planned, there is opportunity for special saving in each department.

A late report of hydraulicking from the end of one of the irrigation ditches indicates the recovery of gold (.938 to .951 fine) to the value of from fifty to seventy-five cents per cubic yard of material moved.

All of the gold in the Snake river district is finely comminuted, and the magnetic iron sand associated with it is also quite finely divided. It may be found practicable to withdraw the iron sands by magnetic separators, leaving a smaller volume to be subjected to amalgamation.

IRON-SAND.

In the abstraction of gold a large amount of this finely comminuted iron sand is collected as a by-product; and if this can be obtained free from other sand by supplementing the sluice work with magnetic separators it may be possible to form the material into briquettes and smelt it in blast furnaces, or it may be converted into iron sponge by a direct process. Up to the present time the difficulty of obtaining a uniform product has interfered with the utilization of direct processes, but future advances in electro-metallurgy may make these sands convertible; at present this is not assured. The distribution of the iron sands is such that the cost of winning them alone will be too great to encourage their utilization; but when obtained as a by-product from gold washing it may be possible to convert them into merchantable material.

THE LIGHTING AND HEATING OF POCATELLO.

By railroad American falls is twenty-six miles from Pocatello, but a pole line can reduce this to about twenty-two miles by utilizing a pass. Pocatello, with a population of 5,500, is located in the Fort Hall Indian reservation, and consequently has little near-by farm land to contribute to its prosperity; but much improvement is expected from the passage by Congress of a bill which provides for the purchase of 100,000 acres of the reservation, tributary to Pocatello, and the opening of it for settlement. This means cultivating the farm lands and exploiting the mineral deposits.

It is contemplated to utilize a portion of the power available at the American falls to generate electricity, which will be conveyed to Pocatello, and to provide for such industries as may find the use of cheap power desirable at or near the falls. The fact that the railroad crosses the Snake river immediately at the falls gives encouragement to expect such possible utilization of a part of the power.

The general scheme is an evidence of the revival of interest in water power development which characterizes the present time—a revival made possible chiefly by improvements in the design of water-wheels and in the application of electrical energy to many purposes.

The features of this undertaking, now in the initial stage of development, have been described in order to invite attention to the possibilities of other localities which may possess similar advantages.*

Mine Development Defined.

The Supreme Court at San Francisco recently decided that the development of a mine does not necessarily consist in surface work, or work done upon the claim itself. Houston Mann located the Ontario mine in San Bernardino county, Cal., and owned the continuous and overlapping claim called the Jeanette. He was engaged in driving tunnels on the Jeanette for the purpose of tapping the ledges of both claims, when Al Budlong and George Deck entered upon the Ontario mine location, and suit was brought by Mann to oust them. In the lower court a decree was entered in favor of the defendants, the findings upholding the contention of the defendants that the mine had been abandoned by the plaintiff.

The Supreme Court has reversed the decree, holding that "the necessary amount of work thus having been done upon the Ontario with the manifestly honest intent of striking the lode, and developing the mine upon a definite plan, even if that plan should result in failure, it cannot be judiciously said that the work contemplated by the law was not done."

*Transactions Am. Inst. M. E.

Dredging in British Columbia.

E. C. Kingswell of Kamloops, B. C., is the author of an interesting letter addressed to the editor of the Mining Journal of London on the possibilities of dredging in British Columbia. Mr. Kingswell was born in New Zealand and lived there thirty-five years. He has had fourteen years' experience in all kinds of mining, and his opinion that British Columbia rivers will compare favorably with those of New Zealand for dredging, is therefore entitled to careful consideration. He presents these reasons for his belief:

First, the climate, in my estimation, is more favorable than New Zealand, and, as it does not rain half as much as it does upon the Clutha, and the rivers only rise up for about six weeks, and then quickly fall as soon as the snow melts; this will enable the dredges to work in the centre of streams nearly all summer.

Secondly, vast areas of British Columbia have been worked to water level by the old pioneers, and very large quantities of gold have been taken out, especially in the famous Cariboo district, and most of the small streams flowing into the large rivers contain and carry gold and act as grand feeders to the main rivers.

Thirdly, the wash here, especially in the now famous North Thompson, is especially friable, and has a proved soft blue marine bottom, and the wash has no alluvial clay to carry away the fine gold, and for ninety miles up—as far as I have been—I saw no boulders that could possibly interfere with any ordinary New Zealand dredge. In that distance I only found one canyon that could not be worked (about one mile), and this canyon opened out into a grand basin that will be a famous dredging area, in my estimation.

Fourthly, the gold seems to be evenly distributed through the wash. I could only get down to eighteen feet deep, and in that distance I found it average fifteen cents per yard. All visible gold was easily saved. I did not require to use quicksilver at all. The black sand, which averages about one per cent of the full, assayed very high, up to $30 per ton. I consider, though, that a very large proportion of this gold would be saved upon a dredge with 200 feet of tables; I used a small rocker. All the bars upon the river carry payable gold. I have had as much as 8s. per yard washed out of bars. Numbers of Indians and white men wash all the fall and part of winter, and do very well.

Fifthly, the timber upon the bank of this river is a very light pine, and never lodges in the wash, gets carried down the stream to lake and sea. I never came across a buried log in my six months' experience of rivers here. The timber here is very light. A team can be driven anywhere upon the banks; no difficulty will be experienced in removing trees, as there are no tap roots, and it burns very easily. Fuel can be easily and cheaply got from sides of mountains and banks of streams. In my opinion, ample power can be got from several small rivers that flow into Thompson, and can be utilized as an electric motive power. Hundreds of feet of fall can be got at very little cost, and the hills contain hundreds of lakes that could be tapped.

Sixthly, the river here has a very slight fall, and is a particularly slow stream, averaging about two and one-half miles an hour; no difficulty in anchoring a dredge, and the river has splendid alluvial banks that I have proved auriferous. The average height, I should say, is about ten feet. The river does not change its course, and has not done so for a generation.

Seventhly, the law here allows you to take up five miles of any river bed (as against one mile in New Zealand) for £12 10s. per mile rent and a royalty of 2s. per ounce of gold. Bench claims can be taken up to make a dredging area of six to 800 acres. I have taken up in one stretch ten miles of river bed and bench claims that will keep twenty dredges working a lifetime. A claim is very easily secured in British Columbia. No advertising or court fees to be paid. The Gold Commissioner recommends the Minister to grant a claim and it is done, and you secure right in a month, whereas in New Zealand advertising, lawyer's fees, etc., cost a small fortune.

Eightly, there is magnificent timber all over British Columbia to build the pontoons, and roads and railways are in close proximity to dredging areas. In fact, I unhesitatingly say that British Columbia is in every way an ideal country for dredging, and holds out a certainty for the British investor, provided, of course, that the claim is properly reported upon and tested. I might mention that an English company has a New Zealand dredge at Lytton, sixty miles from here, upon the Fraser River. A New Zealander has taken charge of her, and the part owner, Mr. Cobbledick, now says publicly that he is more than satisfied with his first month's returns. Another dredge is just about to be built upon the North Thompson, and, having thoroughly tested the ground, I will guarantee that she will return to her Liverpool owners a fortune, provided, of course, that they carry out the New Zealand principle of dredging. I might say, as regards creek and dry land dredging, that I have seen ideal ground to start dredging. I have seen hundreds of acres turned over for surface gold, and no bottom was reached; several of these ideal places were on edges of big lakes, etc. In my limited travels I have been pointed out plenty of ground that could not be dredged, and I am aware of failures upon the Fraser; but no wonder. I say all these dredges were of the spoon and dipper pattern, and could not lift as much in a day as our dredges can lift in an hour. In my estimation the Fraser will not be a good dredging field. The area is limited, and the bottom is very rough. No doubt there are some very rich basins and bars in it, but it cannot compare with the North Thompson and others in British Columbia.

In conclusion, let me strongly advise the British investor to look into this field and copy the success of the New Zealanders, and I will guarantee British Columbian rivers will return the money a hundred fold. Of course, I have fish to fry, and, therefore, am sure to crack it up, but if I have made any misstatements I shall be pleased to be hauled down.

The San Lucas Canyon.

George Shaw of Santa Ana, Cal., says: The San Lucas canyon presents an appearance of the mining days of '49. The whole canyon is taken up by claims and a number of good mines are being worked. Camps and miners' lodges are scattered about over the claims, but none makes as good a showing as the Three Nations, which is being worked by a gang of fifteen men. George Shaw, in company with five other young men from this city, has been working on this claim for its Santa Ana stockholder. They have sunk one shaft down to the bedrock and tunneled for a number of feet under the mountain. The boys have made good wages during their stay in spite of the lack of water, which is the only drawback to the place. Paying dirt is plentiful, but water without paying for it is very scarce and must be hauled a long distance.

As soon as circumstances will allow the boys will return to their work, and this time to work in earnest. They have negotiated for some mining machinery and expect to startle the camp on their return. There is a quartz claim being worked in the canyon by W. E. Johnson of Perris, which is expected to surprise the miners of this district. This claim is the best of its kind being worked in the canyon, although it is but partly developed, and as yet its real value is unknown. Many old miners have failed to give credit to the stories of the Mission Indians in regard to gold in large quantities to be found in our mountains, but from the way the San Lucas canyon is developing their stories may yet be proven true.

Northern Washington's Coal Fields.

Israel C. Russell of the United States Geological Survey has completed an examination of the sections of the state of Washington north of the Northern Pacific Railroad, where the road crosses the Cascade mountains. The section extends to the international boundary line, a distance of about 100 miles. Mr. Russell says of the coal in that vicinity:

"The most valuable of the mineral deposits here claiming attention are the coal seams in the Ro-

lyn sandstone. At the town of Roslyn a shaft of 628 feet in depth has been sunk, and from its bottom an extensive series of galleries excavated in the main coal seam, which is five feet four inches thick. The coal is bituminous and highly valuable for generating purposes. At the Cle Elum mine, in the eastern outskirts of the village of Cle Elum, a shaft 250 feet deep, begun in 1894, reached a seam of coal 4.5 to 5.5 feet thick. In July, 1897, a drift had been carried eastward from the bottom of this shaft for sixty feet, another westward about 600 feet, and another northward about 300 feet. The dip of the strata exposed in these workings is south at an angle of fourteen degrees. The output of the mine at the date just stated was 125 tons per day. This coal seam is not the same as that worked at Roslyn, but occurs at a higher level in the geological series. At a locality in the hills about two miles north of Cle Elum, the Ellensburg Coal Mining Co. has worked another coal seam in a small way by means of a drift starting at the outcrop of the coal and running eastward about 600 feet. The coal is there four feet thick.

"The total output of these mines, derived mainly from the workings at Roslyn, was 231,534 tons, with a value of $485,520 in 1895, and 481,710 tons, with a value of $1,027,209 in 1899.

"Tests made by means of a diamond drill conducted by the company operating the Roslyn mines, show that coal of workable thickness and good quality underlies an area measuring a square mile or more in the valley of Yakima, to the southeast of Cle Elum. This area extends to the Yakima river, but whether it occurs to the south of the river, as might reasonably be expected, has not been ascertained. Coal outcrops in the valley of the main trunk of Teanaway river, to the north of Roslyn and Cle Elum, but no mines have been operated in that region. Examinations for coal have been made on First creek, near the north end of Green canyon, at the head of Williams creek, on the west side of Table mountain and on Naneum creek, a southward flowing stream which has excavated a canyon-like valley in the more elevated portions of the Table mountain plateau. Coal seams have been found at each of these localities, but not in commercial quantities. Whether these examinations have been sufficient to demonstrate the absence of valuable coal seams is not known to the public. Several openings have been made in search of coal near Camas Land, along the Peshastin, below the mouth of Camas creek, and in the valley of the Wenatchee, but thus far without success. It does not seem, however, that any of these tests were sufficiently extended to demonstrate the absence of workable seams."

Coal Measures of Routt County, Colorado.

Prof. F. V. Hayden has written for the Evening Post of Denver the following interesting letter about Routt county's anthracite deposits:

"This county (Routt) is probably better supplied with coal than any other portion of the state, extending across the whole county a distance of nearly sixty miles, and more than that in width. At some points, however, basalt or volcanic rock shows up, in which vicinity the coal has been turned out, as the volcanic action shows strong evidence of being a later period than the coal deposits. These volcanic fires have, where the heat has not been too great, probably coked the coal deposits, and ages of time, together with great pressure has compacted this coked matter into genuine anthracite. So far as is at present known there is but one place in the county where anthracite is found, namely in the Elk Head range, about twenty miles from Steamboat Springs, in a nearly northwest course. Here the earth has been upheaved and two veins exposed, probably nearly 100 feet apart. These veins average about five and six feet each in thickness. The coal in these veins is very hard and averages well with Eastern coal in quality. In fact, it is claimed by parties who have tested both Pennsylvania coal and specimens from this field that the Routt county product gives less ash and slightly more carbon. In doing the necessary development work to secure this coal land the coal was wheeled out on the dump and has lain there exposed to the elements without covering. Last fall J. W. Hughes & Co. purchased several tons for use in a base burner stove in their fifty by eighty-foot store at Steamboat Springs. The result was that they kept the room comfortable with it even after an exposure of nine years to weather that would almost have disintegrated a granite boulder. That this is the only section of the country where anthracite is to be found is a mistake, as every condition for the formation of the same character of fuel is found in a dozen different portions of the county far removed from each other, these beds only being exposed by some internal upheaval, cracking along the line of the same, one side dropping to place and the other remaining tilted. Taking other proportions of the field into consideration and as a guide, there is evidently a still lower and thicker vein underlying the two exposed, the two upper ones agreeing closely with these in thickness, while the one lying probably 100 to 150 feet deeper ranges in thickness from fourteen to twenty feet. The farther we go west the more erosion has taken place, first one vein then another, until finally all have been rubbed or worn away. As to the general quality of the coal in this section, it is a very safe statement to make that we have no poor coal. On first opening a bank before a depth is reached the product burns freely, but slacks easily. As greater depth is reached this tendency to slack disappears; a very little sulphur is found in any of it, and the tendency to slack is only conspicuous by its almost entire absence.

"Probably one-half of the field has been appropriated by individuals, the greater portion by homestead, pre-emption, timber culture and desert claims, the Colorado Fuel & Iron Co. having done about all the filing as legitimate coal claims. The general character of the coal here is lignite, although of far better quality than is found on the eastern slope, semi-coking and considerable of it semi-coked. This is a peculiar statement, but can only be qualified by saying that as a majority of it is neither anthracite, cannel or bituminous, it must certainly be as stated or a new name coined to fit the occasion. Lying within this coal measure we find an extensive oil field. This basin is within one mile of the eastern edge of the field and is being fast located by men interested in such matters. Since January, five separate corporations have had representatives in the field. The first two secured by lease and location 10,000 acres. What the three remaining outfits will be satisfied with can only be imagined. Already we are becoming familiar with derrick, pipe line and refinery talk, but so far there has been no great distribution of wealth. When this much-hoped for time will come we can only exclaim, in the language of our lately defeated enemies: Qui en sabe?"

Qualitative Tests for Boracic Acid.

In the Journal of the American Chemical Society there appears a valuable suggestion as to the conducting of qualitative tests for boracic acid, by E. M. and M. L. Wade, the Los Angeles assayers. The writers say:

It seems not to have occurred to authorities on the subject to test the effect of the alcoholic vapors of boracic acid on turmeric paper. We find that, if the test is applied in the following manner, the presence of boracic acid in minerals is rendered more certain and delicate:

Use a test-tube about 2.5 cm. in diameter and twenty cm. long. Put into the tube about 0.1 gram of the substance, 0.5 cc. hydrochloric acid, and ten cc. wood alcohol. Boil vigorously down to small bulk, agitating the lower end of the tube in flame of burner, and holding the moistened end of a piece of turmeric paper just outside the mouth, so as to catch the vapors. Boracic acid will finally color the turmeric a characteristic red. Now, if the turmeric is placed vertically on the side of a beaker so as to dip into a little distilled water to which a few drops of ammonia have been added, a pinkish to deep purple or blue will be produced, in marked contrast to the red produced by the ammonia on the end of the paper unaffected by the vapors.

An Effective Pipe Wrench.

Machinists often have trouble with pipe wrenches which they seem to be unable to operate without crushing or badly bruising the pipe. We present herewith a cut of the Atlas pipe wrench which is designed with a view to avoiding this trouble. The cut shows an eighteen-inch wrench holding a two-inch pipe, and makes it easy for one to see why the wrench does not bruise the pipe. The teeth of the wrench hold the pipe at an angle, with the gripping point in advance of the handle, so that in screwing the pipe one uses it ahead, but does not dig into the pipe and drag it as with some wrenches. It is said to be impossible for the Atlas wrench to lock on the pipe.

The Atlas wrench is fully as effective when extended as when used on smaller sizes of pipe. The movable jaw can be placed in any one of three slots clearly shown in the cut. In this instance it is in the third slot. By shifting it to the second or middle slot, the wrench can be used on smaller sizes of pipe, and when in the first it is ready for use on the smallest size. In the eighteen-inch wrench, for instance, the first slot is for pipe measuring from one-quarter to one inch, the second for pipe from one and one-quarter to one and one-half inches, and the third for two-inch pipe. The movable jaw shown in the illustration is not a screw jaw and has no weak parts. The wrench has no nuts and no delicate parts which can get out of order or break. It is constructed of special drop-forged steel and every wrench is thoroughly tested before it leaves the shop of the makers. The twenty-four-inch wrench takes a pipe one-half inch larger than the smaller ones, while another inch in the size of the pipe is allowed by the use of the thirty-six-inch wrench. A set of four wrenches would thus handle all pipes ranging from an eighth of an inch to four and one-half inches. The Atlas wrench is made by the Atlas Pipe Wrench Co., Flood Bldg., San Francisco, and an eastern office is maintained by the company at 121 Liberty St., New York City.

THE ATLAS PIPE WRENCH.

Nova Scotia Iron Mines.

George B. Cowlam has sent an interesting letter to the editor of the American Manufacturer concerning the recent discovery of iron ores in Antigonish county, Nova Scotia. The writer claims that this will be the next great center of interest and activity in the world's great iron trade. He says: "Here in a ridge nine miles long and in the main 1,000 feet high, parallel with and a couple of miles distant from the straits of Northumberland, are vertical veins of solid, compact hematite averaging something over fifty per cent metallic iron, with a total width of ninety-eight feet. It is estimated that in the nine miles there are 450,000,000 tons of ore above sea level, nine-tenths of it above drainage level, with possibility of increase from incoming new veins and certainty of increase by going below sea level. These veins are all disclosed in a narrow gorge which cuts the mountain to its base and have been faced up at various levels from summit to bottom of gorge. They have been traced and in many cases cut along the top and ends of the range showing their continuance throughout with no change except that the veins broaden somewhat in the southwest end of the range, which is the higher and broader part of the mountain. These ores can be mined at a cost not above quarrying, very cheaply transported to numerous harbors by the building of about thirty miles of railroad, and can be laid down in English ports, 2,000 miles distant, at a cost of $1.25 to $1.50 per ton, to our Atlantic ports at even lower figures, barring a duty of forty cents. With these ores in British hands the export trade in both ores and iron and steel from America can be not only controlled but absorbed, as the quantity of ore is sufficient to fur-

nish 5,000,000 tons of pig iron a year for forty years or more and may be largely increased.

"The property is being rapidly uncovered, and will doubtless be on the market late this fall or early next spring, when our iron makers will have a chance to compete with those of Great Britain for control.

"Coking coal lies just east of the iron range, and ten miles away abundant limestone, so that conditions are much like those around Birmingham, Ala., plus a bounty of three dollars a ton."

Yellow Aster's Pumping Plant.

The Randsburg Miner reports that the pumping plant of the Yellow Aster Company is nearly completed and will soon be in operation. The Miner says:

After the pump is started and they can handle the water, work will be resumed and the well sunk deeper. This water system with everything connected with it, including well, pipe line, reservoirs, engines and pump, will represent an outlay of not far from $75,000, and is very thorough and complete, everything being of the best. The next move of the company will be either to sell the mines and all connected with them, or increase the capacity of the mill by adding forty more stamps, and this will be determined shortly.

Applications to purchase are received daily, and men have made long and costly journeys, with little or no encouragement, to interview the owners, and if the management decides to sell a fancy price can be obtained without trouble. The fact that the water problem, a difficult one in this desert country, is solved and water is developed and a magnificent system of works established to deliver it on the ground at the mines will enable the Yellow Aster people to get much more than this plant has cost in negotiating a sale. No time will be wasted, however, on this score. If a sale is not soon made, or an excellent prospect of one, the company will immediately proceed to put up forty additional stamps, as they feel sure they have plenty of water to run 100 as well as seventy.

Last month 3,894 tons of ore were mined and milled with an average force of sixty-two men in the mines. This was an average of four and one-third tons to the stamp, and at an actual cost of mining and milling of $2.36 per ton. Considering the cost of everything here on the desert and that the water was pumped from deep wells six miles away from the mill this is getting it down to pretty close figures.

The Guiana Gold Fields.

United States Consul George H. Moulton, whose station is at Demerara in British Guiana, is at home on a leave of absence. He talks interestingly concerning the conditions of gold mining in British Guiana and Venezuela, and it seems to be his opinion that these fields do not furnish an especially attractive outlook for American miners. He says:

"The rush to the gold fields of British Guiana and Venezuela, which was expected to follow the settlement of the Venezuelan boundary dispute, failed to materialize. The new boundary fixed by the arbitration court is quietly accepted by the people of British Guiana and Venezuela, and no further dispute is likely to arise. Gold mining is still being prosecuted in the British Guiana gold fields, and there are a few Americans who are there trying to make their fortunes.

"The yield of these gold fields is about $2,000,000 a year. All the gold obtained is secured by placer mining. No shafts have yet been sunk for lode mining. Mining in British Guiana is attended by the greatest difficulties and hardships, and there is also some danger to life and limb. The gold fields are all at some distance in the interior. To reach them the miners have to travel through swamp lands and dense brush, which are infested by alligators, enormous reptiles, and wild beasts. Everything the miners carry along has to be packed by men. The Essequibo and Demerara rivers are great rivers, but they are not navigable for more than seventy-five miles, owing to many obstructions and frequent rapids. The miners who go into the interior by following these rivers court great danger.

"I know of one American miner who has a claim which it takes him twenty-three days to reach from the seashore, but so swift are the streams by which he travels that he can come down to the seashore in a week. British Guiana is no place for American miners. They can do better in Colorado or Montana."

SWISS STEEL INDUSTRY: Switzerland has not until now been noted as a center for steel production, though her engineers have long held a high position in the mechanical world. Recently, however, a company has been formed to work the great deposits in the Bernese Oberland, where there are many million tons of ore available, averaging fifty per cent of iron. It is intended to smelt the metal electrically, the large water power, cheaply obtainable, giving the project a reasonable prospect of success.

PEAT AS FUEL IN RUSSIA: Consul Hughes writes from Coburg—"The question of the scarcity of fuel in Russia has long occupied the attention of scientists. Coal is found only in small quantities, while wood is by no means sufficiently abundant to warrant extensive consumption. It is proposed to surmount the difficulty by turning the enormous quantities of peat to account. In many districts, the turf almost represents the staple fuel. Its calorific power is said to be double that of wood. The turf is compressed into small briquettes and sent to the market. It is estimated that the cost of manufacturing it for commercial purposes is about $5.84 a ton, which at present compares very favorably with the price of coal.

The Iron and Steel Supplement.

The second edition of the supplement to the Iron & Steel Directory of the American Iron & Steel Association has just been issued by James M. Swank, general manager of the Association, from his office, No. 261 S. 4th St., Philadelphia. The present supplement is issued as a more complete list of the iron and steel consolidations than the descriptive list which appeared in March. It comprises the organizations included in the March list, besides many others. The list has been confined to consolidations embracing the ownership of blast furnaces, rolling mills, steel works, tin plate works and auxiliary industries such as bridge and shipbuilding. It contains only companies that have been consolidated since January 1, 1898, when the last directory to the iron and steel works of the United States was issued.

The book is a handy little volume of seventy-eight pages with board covers, and will be of great value to all persons in any respect interested in the immense enterprises described. Complete lists are given of the branch concerns of the big companies.

Mr Swank says in his preface that every consolidation described is in good faith what it pretends to be, and contributes his opinion on the "trust problem" by describing the typical consolidation in the iron and steel industries as follows.

"It represents a large investment of capital for the purpose of uniting in one ownership and under one management independent and often widely separated plants. This policy of concentration of capital and energy, which is in accordance with the industrial spirit and necessities of the age and is world-wide, is amply justified by the increased facilities it affords for securing economy in production and efficiency in management. That these consolidations have not been organized to repress competition or to arbitrarily maintain prices is abundantly proven by the active competition which prevails between many of them and by the rapid decline that has recently taken place in all iron and steel prices."

For detailed information concerning the plants mentioned and their products reference is given in the supplement to the pages in the directory in which the plants are fully described. Copies of the book may be secured by applications to Mr. Swank at the price of $2 a copy.

Latest Mining Decisions.

(Specially prepared for THE MINING AND METALLURGICAL JOURNAL.)

Plaintiff located a mining claim, and thereafter defendant entered on the land, claiming it as vacant mineral land, in that plaintiff had failed to do the amount of work required by the law for five years previous. Plaintiffs owned a claim that overlapped the claim in dispute, and on the land common to both claims had done work in the way of tunneling largely in excess of that required by law, with the manifest intention of striking the lode of the claim in dispute. Held, that a finding that the work performed could not be a benefit to the claim in dispute, and that plaintiffs were not entitled to same, was erroneous, since the court could not be permitted to substitute its judgment as to the expediency of the method employed for developing a mine for that of the owners. Mann vs. Budlong et al., 62 Pac. Rep. (Cal.) 120.

TRADE NEWS.

The Jeffrey Mfg. Co. of Columbus, O., requests us to announce that their chain catalogue is now ready for distribution. Like all of the trade literature issued by this company, this catalogue is most attractively prepared and is of much interest to mining engineers and superintendents.

The Sullivan Machinery Co. has moved its Chicago offices from 64-60 N. Clinton St. to Rooms 1220-1221 Merchants' Loan & Trust Building, 135 Adams St. The store and shipping department will remain in Clinton St. The officers of the company extend a cordial invitation to their friends to call upon them at their new headquarters.

The contract for the erection of new buildings in Jamaica Plain, Mass., for the use of the Buff & Buff Mfg. Co., manufacturers of engineering instruments, has been awarded to John P. Campbell, a Boston contractor. The plans call for two-story brick structures to be built according to the latest type of mill construction. An isolated stone building will be included to accommodate the concise graduating engines owned by the company.

D. Van Nostrand & Co., sellers of scientific books at 23 Murray St., New York City, describe in their July and August bulletin an extensive handbook on diamond drilling intended for use in prospecting and exploiting gold-bearing and other mineral properties. The author is G. A. Denny, who has had considerable experience in South Africa. The drills described are those of the Sullivan Machinery Co. and the M. C. Bullock Mfg. Co., both of Chicago. Particulars as to the cost of this apparatus and the manner of their working are given in detail. The price of the book is $5.

We are in receipt of an attractive catalogue from the George E. Dow Pumping Engine Co. of San Francisco. The catalogue describes in detail the steam, electric and power pumps and hydraulic machinery made by this well-known house. It is a book of 113 pages. Especial attention is given to the Dow compound sinking pump which has been extensively introduced in mining operations where large quantities of water more or less burdened with foreign materials have to be handled. The Dow mine station pumping plant adapted to the deepest mines is also illustrated and described. Copies of the catalogue are sent to all applicants interested in mining operations.

Construction and Development News.

Luke Latimer will develop gold deposits near Washington, Ga.

A pyritic smelter of 100 tons capacity is to be put up at Ouray, Colo.

The Centennial-Eureka mine of Salt Lake City, Utah, is to be provided with a smelter.

The App mine at Sonora, Tuolumne county, Cal., is to add forty more stamps to its mill.

The Golden West Co. of Tuolumne county, Cal., may erect a new mill upon its property.

The Mt. Jefferson mine at Groveland, Tuolumne county, Cal., is erecting a twenty-stamp mill.

The Shawmut mine at Sonora, Tuolumne county, Cal., is erecting a chlorination plant.

The Merced Gold Mining Co. of Mariposa, Cal., intends to enlarge its plant in the near future.

Two five-foot concentrators are being put in at the Keystone mine in Amador county, Cal.

The Texas Coal & Fuel Co. of Weatherford, Tex., wants machinery for developing coal mines.

The Mariposa Grant Co. of Mariposa, Cal., may purchase a new ten-stamp mill for the Mariposa mine.

The Quinnimont Coal & Iron Co. of Quinnimont, W. Va., is in the market for coal mining equipments.

When the work of straightening the shaft of the Humbolt mine of Helena, Mont., is completed, a steam hoist may be installed.

The management of the Juno mine of Nelson, B. C., has resolved to make the mine a producer. A plant to treat the ore is to be installed.

The Carnegie Steel Co. of Pittsburg, Pa., will build a rod mill in connection with the new group of finishing mills to be built at Duquesne.

Ten more stamps are to be added to the mill of the Mt. Jefferson mine near Sonora, Tuolumne county, Cal.

A large smelting plant is being built in the township of Denison, Ont., Canada, by the Ludwig Mond interests.

It is reported that the Oregon Reduction Works at Baker City, Ore., will build a smelter plant and a branch smelter in Burkement.

Ed. Kay of Jackson, Cal., is in charge of the construction of a ten-stamp mill fourteen miles from Nevada City, Nevada county, Cal.

The Humbolt mine of Georgetown, Colo., is being cleaned out, and a whim will be put up at once, when development work will be pushed.

The Mineral Products Co., which has its headquarters at Moncton, N. B., is considering the construction of smelting works to handle manganese ores.

The new Pittsburg & Baltimore Coal Co., which is preparing to operate mines on 3,000 acres of land south of Irwin, Pa., will be ready to start in a short time.

The Ballarat Mining Co. at Ballarat, Inyo county, Cal., will probably increase its stamp mill to forty stamps soon. F. H. Verencamp is the superintendent.

McGilvery & Brown, who own the Driscoll mine in Washington Gulch, Mont., are now getting out ore and developing the mine with the purpose of putting up a mill.

The Congress Gold Co., W. F. Staunton, superintendent, of Congress, Ariz., is contemplating the erection of a new forty-stamp mill and the enlargement of their cyanide plant.

The Nickel-Copper Co. of Hamilton, Ont., is pushing developments in the ore fields. This company has a fifty-ton smelting plant in course of erection at Worthington station.

Justus Collins of Collinsville, W. Va., has recently bought 1,200 acres of New River coal lands. Mr. Collins purposes developing the property as the projected railroad is built to it.

Maj. H. M. Russell of Los Angeles, Cal., is manager of the Mammoth mine near Isabella, Kern county, Cal., and intends adding twenty more stamps to his ten-stamp mill.

The St. Louis Co. of Virginia City, Nev., has recently added to its property. The work of developing and extracting the low-grade ores will begin before the close of the season.

The Gold King Mining Co. has closed down its El Paso mine in Poverty Gulch, Cripple Creek, Colo., to install a new plant that will be a duplicate of the one recently placed in the Strong mine.

The McClintic-Marshall Construction Co., Park building, Pittsburg, Pa., has bought a site of fourteen acres in Rankin, near the plant of the American Steel & Wire Co., and will put up new works.

The Eagle Bird mine at Maybert, Nevada county, Cal., is to be extensively opened in the near future. It is the property of the Eagle Bird Mining Co. and W. M. Wilson is superintendent.

The Gold Bug property, owned by the Gold Bug Mining Co., at Georgetown, El Dorado county, Cal., is to have an electric power plant. W. E. Thorne, M. E., is the manager and superintendent.

The Scott-Valentine syndicate of England is making a deal for the Britannia mine, Vancouver, B. C. If the deal is completed the mine will be developed on an extensive scale and smelters will be erected.

A steel hoop mill will be erected in connection with the steel works and tin-plate mill now building at South Sharon, Pa. F. V. Buhl, John Stevenson, Jr., of Sharon, and the Clark Bros. of Pittsburg, are interested.

Louis Will, a capitalist of Syracuse, N. Y., has purchased the Yellow Jacket group of mines, near Rossland, B. C. He intends to improve it by adding a new mill, a tramway two and one-half miles long, and an electric plant.

Barry N. Hilliard of Wallace, Ida., one of the owners of the Murray mine, wants to put in a plant and hoist and begin extensive work, but there are other owners whose money is tied up in other claims, and it may take considerable time to come to an agreement.

Machinery is being constantly added to the Dos Cabezas mines at Dos Cabezas, eighteen miles south of Willcox, Ariz., owned by the Dos Cabezas Consolidated Mines Co., composed of Los Angeles parties, and it is now reported that a sixty-five-ton smelter is to be erected soon.

John R. Tregloan, the owner of the Excelsior mine at Amador City, Amador county, Cal., intends to equip and develop the property in the near future. This is a new mine and adjoins the Bunker Hill on the east.

All improvements are being moved to the mouth of the Watt tunnel on the Brown Bear property, at Deadwood, Trinity county, Cal. The Brown Bear Mining Co. is the owner, with Chas. D. Dobler as manager and superintendent.

The Pennsylvania Steel Works at Harrisburg Pa., recently bought ground adjoining their present property, and upon this they intend to build. A new machine shop will be 300 feet long, and will be equipped with large quantities of machinery.

The addition of 120 stamps is to be made to the mill of the Royal Consolidated Mines Co. at Hodson, Calaveras county, Cal., forty stamps of which are now being installed. J. C. Kemp van Ei is the superintendent and W. F. Larrigan the secretary.

C. C. Bush, Jr., and H. C. Woodrow, who have a bond and lease on the Texas group of mines at Hart, Shasta county, Cal., are extending a tunnel 1,500 feet and sinking a new shaft. They will add twenty more stamps and a cyanide plan to the present twenty-stamp mill.

Additional furnaces and a new plant for the utilization of low-grade ores are to be erected on the property of the Mountain Copper Co. at Keswick, Shasta county, Cal. Lewis T. Wright is the general manager and H. W. Edwards assistant general manager for the company.

The Caballero Onyx Mining Co. of New Mexico has been organized by El Paso business men with a capital of $360,000 for the purpose of developing and working the company's onyx mines. The company will put in its own manufacturing plant, and hopes to supply Europe as well as this country. The officers are Lew Gilbert, president; H. E. Runkle, vice-president; C. W. Alexander, secretary. The main office is in El Paso, Tex.

It is reported in Mariposa, Cal., that the ore from the Mariposa mine, on the old Mariposa grant, controlled by the Mariposa Commercial & Mining Co., averages about $20 a ton, and this has so encouraged the management that they intend erecting a ten-stamp mill upon the property. The ore is now milled at the Princeton mill, another of the company's properties.

At the Shawinigan Falls, on the St. Maurice river, Quebec, industrial developments are proceeding on a large scale. The power company which is completing works for utilizing the falls, to produce hydraulic and electric energy, has already expended a large sum. A. C. Rice of Worcester, Mass., is the company's engineer. He will place all contracts for the development of power, erection of buildings and the furnishing of machinery.

The Congress Gold Co. at Congress, Ariz., with W. F. Staunton as manager and superintendent, contemplates the erection of a new forty-stamp mill and cyanide plant. The depth of the main shaft is now 2,600 feet, while the length of the main tunnel is 1,200 feet. There are forty stamps now in operation and twenty concentrators. The daily capacity of the cyanide plant is 130 tons of ore. There are 350 men employed in and about the property.

New Mining Applications.

Herman J. Rossi, Wallace, Ida.: De Long lode, Lalande district, Shoshone county, Ida.

John P. O'Neil, Burke, Ida.: Mono Traction lode, Lalande district, Shoshone county, Ida.

Marshall M. Taylor, Wallace, Ida.: Cape Nome lode, Hunter district, Shoshone county, Ida.

James Johnson and J. H. Clive, Galena, Nev.: Washington lode claim, Lander county, Nev.

George Hofheims, Bland, N. M.: Monte Cristo group of lode claims, Bernalillo county, N. M.

Louise E. Cramer, Breckenridge, Colo.: Louise placer, Pollock district, Summit county, Colo.

Jacob E. Corbett and Ira A. Flood, Denver, Colo.: Lake placer, Miners district, Summit county, Colo.

Martin Hammer and P. A. Sorensen, Salt Lake City, Utah: Northern Light lode claim, Summit county, Utah.

Hecla Mining Co., by Henry R. Allen, attorney, Wallace, Ida.: Mascot lode, Lalande district, Shoshone county, Ida.

Illinois Mining Co., by its attorney, D. J. Williams, Provo, Utah: Syndicate lode claim, Salt Lake county, Utah.

John T. Hodson, Salt Lake City, Utah: Bunker Hill lode claim, West Mountain district, Salt Lake county, Utah.

Clarence Cunningham, Wallace, Ida.: Mary R., Traction, and Evening Star lodes, Hunter district, Shoshone county, Ida.

Empire State-Idaho Mining & Developing Co., by E. Saxon Wiard, Wardner, Ida.: Arizona vein, Yreka district, Shoshone county, Ida.

San Miguel Consolidated Gold Mining Co., Telluride, Colo., Synvita and Pactola lodes: San Miguel district, San Miguel county, Colo.

Chas. H. Lashbrook, Bingham, Utah: Centennial, Gondola, Paragon, Ruh, Rhue No. 2, and Rhue No. 3 lodes, Salt Lake county, Utah.

Joseph Lerwill and Fred Richards, Bingham, Salt Lake county, Utah: Yukon lode claim, West Mountain district, Salt Lake county, Utah.

J. M. Moad, L. E. Wade, P. B. Coffelt and G. L. Moad, Red River, Taos county, N. Mex.: Esther mine, Red River district, Taos county, New Mex.

J. H. Clive, Galena, Nev., by attorney, James Johnston, of same place: Ethel C. lode mining claim, Battle Mountain district, Lander county, Nev.

James K. Shaw, Salt Lake City, Utah, and Raphael S. Giuliani, Bingham, Utah: Diamond Extension, No. 2, Salt Lake and Tooele counties, Utah.

Butler Mining & Milling Co., by its agent, W. A. Wight, of Salt Lake City: B. F. Butler, No. 2 lode claim, West Mountain district, Salt Lake county, Utah.

Hercules Consolidated Mining Co., by Thomas H. Kane, attorney, Silverton, Colo.: Excelsior lode, and State Street lode, Animas district, San Juan county, Colo.

Trade Dollar Consolidated Mining Co., through its attorney, James Hutchinson, Dewey, Owyhee county, Ida.: Gordon lode claim, Carson district, Owyhee county, Ida.

J. A. Blossom, Battle Mountain, Nev.: Copper King and Copper Queen mines, Widow, Blue Bird and Sweet Marie claims, Battle Mountain district, Lander county, Nev.

Trade Dollar Consolidated Mining Co., through its attorney, James Hutchinson, of Dewey, Owyhee county, Ida.: Sunflower lode claim, Carson district, Owyhee county, Ida.

Trade Dollar Consolidated Mining Co., through its attorney, James Hutchinson, Dewey, Owyhee county, Ida.: McNair lode claim, in Carson City district, Owyhee county, Ida.

Black Crook Mining & Milling Co., by its attorney, William Binford, Boise City, Ida.: Black Crook, Imp and Demon Consolidated lodes, West View district, Boise City, Ida.

Charles F. Painter, for himself and as attorney for the San Miguel Consolidated Gold Mining Co., Telluride, San Miguel county, Colo.: Golden Butterfly lode, San Miguel district, San Miguel county, Colo.

PERSONAL.

J. B. Parks is at present superintendent of the Pacific Dredge Co., which is operating on the American River in California.

August Ziesing has been appointed general western representative of the American Bridge Co. with headquarters at Chicago, Ill.

William Magenan has resigned his position as assayer for the Dexter Gold Mining Co. at Tuscarora, Nev., and A. V. Corry has been appointed in his place.

T. D. Pease of the Liberty Mining & Smelting Co. of Tucson, Ariz., has been in New York looking after affairs connected with his mine. The superintendent of the mine is W. R. Wemple.

W. F. Aldrich, president of the Aldrich Mining Co. at Aldrich, Ala., was offered a nomination for Congress in his district for a third term. He has declined the honor, however, in order to give his entire time to his mining interests.

K. Shimamura, a graduate of a Tokio school, and a mining engineer associated with the Mytsu Bishi Co. of Japan, has been making a tour through the mining sections of Colorado, Montana and Utah.

Walter Hovey Hill, general manager of the Idaho Little Giant Mining Co., Ltd., at Warren, Idaho, is in New York City in the interests of his company. He reports a gratifying state of affairs at the mines and believes that the property has a promising future ahead.

CORRESPONDENCE

CALIFORNIA.

(From Our Special Correspondent.)

Santa Ana, Cal., September 27, 1900.

The hot weather period on the desert is passing away and the miners are returning to their claims. In some places up in the mountains the prospectors worked through the year. From New York peak at Manvel word is received that Joe Lycre ran a tunnel in on water seepings, and by thus working now has about a one-inch flow of elegant spring water. This brings the Good Hope mine and group into the market. The whole group of fourteen claims is being negotiated for by the United Mines Mining Co. This deal is nearly completed, and if closed the Good Hope vein will be developed, and after a crushing and concentrating plant are erected, the product will go to the smelters. The outcrop of this vein carries from $5 to $9 gold per ton, with some lead, concentrating about fifteen tons into one ton of concentrates.

There are several deals nearly consummated for the development of the Manvel gold fields. Considerable lead is being shown up. Black tellurides of lead in quartz have been found which show over $160 gold per ton. This came from the Old Shoes mine, where a contract has been made for the sinking of 100 feet more in the present shaft. Drifting on the vein below is about finished and many claims have been located in this camp and many have had the annual assessment done, showing fine bodies of gold, lead, silver and copper ores. Depth on these veins is all that is required for a good production of smelting ores. It will soon be known who finally secured by purchase the Old Shoes mine and group of claims. The last transactions of the deal are now being closed.

A new company has had an expert mineralogist and metallurgist at work investigating the Santa Ana range of mountains for several months past. This range of mountains is the dividing line between Riverside and Orange counties. The mineral zone circles around Santiago Peak and Saddle Back mountain, the west half of this circle being in Orange county. It is fairly well established and covered with locations. The core of this range is of erupted igneous, rocks, basaltic and chloritic, with granite metamorphosed fields therein. The peak is about 4,000 feet high and the long chain summit just tops 3,000 feet.

The camps on the western slope in Orange county are, Silverado, Alma, Shakespeare and Yeagers property. A great deal of prospecting has been done in past years, and the search has been and is now to determine whether the field is gold-bearing to any extent and to learn the nature of the ores carrying the gold. The lower field of ore-bearing veins has an elevation of 2,400 to 2,700 feet, and the belt of mineralized rock runs southeast to northwest in breaks, with the veins cutting across the belt diagonally. This belt, as stated above, lies in a circle of great dimensions, its west side or rim being on Santiago creek, about three miles above Madame Mojeska's ranch home, at which point is the Alma group of claims—Alma, Boston, Galena, La Esparanza, Eagle, Prospect, Geneva, Mojeska and King Solomon. A 400-foot tunnel on the Alma cuts the vein at a depth of 350 feet. The ore is galena and the production record shows 123¼ tons of ore shipped; gross value, $10,713, net receipts, $8,160. This shows that the 123¼ tons netted about $66 a ton, and the reduction charge then (San Francisco) was about $20.70 a ton, including freights. No gold was reported in that shipment, the values being given for the lead and silver contents of the ore. Recent assays of samples of this ore body gave (1) silver, seventy-four ounces; lead, 53.5 per cent; (2) silver, 92 1-3 ounces; lead, 41.55 per cent, and copper, 4.5 per cent, so that ore from the Alma, according to the second assay will net now about $76 per ton. A fair ore body is in sight, with a mill on the ground and plenty of water to run it.

Evidently the best mine of the group is the King Solomon, which has exposed a great rib of oxidized iron and lead ore ready for grinding into paints. It is of various colors and worth about as much for paint as for the gold it contains. The owner, Mr. Morrow, looks for a top notch price in consequence. There is considerable work done upon the property.

One mile and a half to the southeast is the Shakespeare group of eight more claims, with about 1,000 feet of work done. The assays of these ore show values as below:

	Gold.	Silver.	Lead.	Copper.
1.	$7.75	$2.87	Trace	46.7 %
2	2.06	1.36	....	13.
3	....	546.22	71%	.....
4	12.92	14 74	1.	18 7
5	1.03	1 08	....	3.
6	2 06	3.47	....	7.6
7	20 67	12 71	....	40 9
8	.	39 13	56.2	.....
9.	2 68	4.20	....	6.2
10	4 13	8.37	19.86	25.3
11	....	500.96	72 42	.....
12.	....	56 05	59.1	1.
13	....	67.13	41.55	4.3

The copper, lead, gold and silver showings are good. It is said that the United Mines Mining Co. has bought this ground; at any rate, it is known that they have been and are now negotiating for it with the intention of running a lower tunnel to cut the two parallel veins. A 200-pound lump of ore from the Shakespeare workings gave values of $1,100 gold per ton. The past development of this group has been surface tunnels, on and into the veins, but they have developed a good water supply. The slope of the mountain is to the south, into the Trabuca canyon. The formation of this mineral belt is chloritic igneous rocks, together with volcanic metamorphosed granites.

Nearly due east from here, six miles up the Trabuca canyon, are the Yaeger claims, nine in all, with 3,000 feet of workings, a concentration mill, and buildings, and about 45,000 bricks ready for a smelting plant. There is plenty of fine timber on these claims, and an abundance of water. A 1,200-foot crosscut tunnel discloses, it is claimed, a mineral body over 300 feet thick, and the foot wall not yet encountered. Nickel has recently been discovered in it. This whole group and plant is soon to be turned over to an expert, to determine the values of the exposed ore bodies and tonnage in sight. It is a big undertaking, and if, as claimed, this ore body shows sufficient values to make it pay, it means considerable mining in the locality. The field appears to be the backbone of the Santa Ana range, and the strike of the veins is toward Santiago peak. A yellow iron pyrite is predominant in the vein, and the values are in gold.

To the southward on the west slope of this range considerable prospecting is being done to discover the lodes that give the large, coarse gold nuggets found in the placers of Lucas canyon above the Hot Sulphur Springs.

It is rumored in this section that the Santa Fe Railroad will encourage the erection of a smelter at Olive Station (on their system) in the Santa Ana canyon, where there is available oil for power purposes, and also fluxing material, and with the great abundance of ores on the range, there is nothing lacking but the capital to build the reduction works.

S. A.

MICHIGAN.

(From Our Special Correspondent.)

Houghton, Mich., October 6, 1900.

The new shaft in the Quincy No. 7 is about ready to begin operations. The shaft goes down 4,200 feet and is sunk on a catenary curve which starts from the surface at an angle of fifty-eight degrees with the horizon and at the bottom flattens to an angle of thirty-eight degrees. As the shaft opened a stretch of ground already reached on a number of levels running south from the No. 6 shaft, it could be sunk in several sections simultaneously. The men previously working in shaft No. 6 will be transferred to No. 7 for the present, and the skip track in No. 6 will be relaid to accommodate skips carrying six-ton loads in place of the four and one-half ton loads now hoisted. No. 6 will then go into commission once more and another force of 200 men will be added. It is likely that the Quincy will have 3,000 names on its payroll within a few years.

Four new pumps will be installed in the Michigan mine at once to dispose of the heavy flow of water from the old Minnesota mine. The Michigan is now nearly deep enough to touch the bottom workings of the old Minnesota, and will drain the old mine by driving pipes through the trap rock between the two mines. After the Minnesota is unwatered, a cross-cut will be driven to connect it with the Michigan, and the contact vein will be thoroughly explored. The operators expect to be well rewarded for their work in the old mine, for the miners who were working it nearly twenty-five years ago believe that they left much copper behind.

The Calumet & Hecla's monster pumping engine "Michigan," said to be the largest pump in the world, is to have a companion, the "Arcadia," of 22,000,000 gallons capacity. This is being put in place for a new six-stamp mill which will treat 1,800 tons of conglomerate a day or 2,700 tons of amygdaloid. A product of twenty-seven tons a day would make the amygdaloid of the Calumet & Hecla a larger producer than the Quincy.

MISSOURI.

(From Our Special Correspondent.)

Joplin, Mo., October 8, 1900.

On Wednesday night the price of zinc ore was advanced in a few lots a dollar, and in most of the big lots a half-dollar over the price of the previous week. When the bidding began on Wednesday the price was $27.50 and bids ranged upward to $28.50. The upward trend of prices was led by the representatives of the Edgar Zinc Co. which on Monday bought up ten carloads at Oronogo, nine at Webb City and much more at Joplin. Other smelting companies need large quantities of ore for their winter stock, and the demand is likely to keep prices well up for some time in the future. King Jack brought the highest price—$28.50.

The advance in price tended to cut down the sales, and district shipments aggregated 463 tons of zinc and thirty-nine tons of lead less than in the previous week, the decrease in value being $12,299. The total district sales for the week were zinc, 9,615,770; lead, 936,780; value zinc, $115,982; lead, $22,530; total, $138,512.

GENERAL NEWS

ALASKA.

Consul McCook of Dawson City says that more claims have been worked this summer than in any previous season. On account of the extra rainfall there was sufficient water for sluicing. Many owners will work their claims only during the summer, letting them lie idle in winter, as they can dump the dirt or clay directly into the sluice boxes in summer, and not have to handle the ground twice. Machinery is found everywhere in the district; no one thinks now of working claims without boiler, engine and pump. The amount of gold sent out to August 22, as per consular invoices, was $12,500,000; it is possible that about $250,000 has gone out without any record.

Seattle men are opening up a good silver-lead property on Admiralty Island which was discovered in July. The vein is more than 100 feet wide, the surface ore assaying over $15 in silver and lead and the value increasing with depth. It is proposed to connect the mine with the shore by a narrow gauge tramway.

Transportation facilities in the direction of Dawson are fully occupied with the rush of provisions and machinery. This will be the busiest winter in the history of the Klondike, and efforts are being made to store up supplies at Dawson for the entire season.

Up to September 30, the Government Assay Office at Seattle recorded receipts of $15,000,000, of which $2,000,000 was from Nome, and most of the rest from the Klondike and Atlin. About $1,000,000 more will be added to this total before the season closes. Many miners are stoutly defending Nome against the serious reports which have been spreading abroad concerning the famous beach. They say that if it had not been for lack of water and for mining litigation, the production of the beach would have reached enormous figures. With the new camps now opening up, they predict an output of from $6,000,000 to $10,000,000 for next season from Nome.

ARIZONA.

The Minnesota, Connor and Merrimac mines at Chloride have been bought by the Philadelphia & Arizona Mining & Milling Co. for $300,000.

It is reported that the McGuire mine, four miles south of Kingman, has been sold. After a well has been sunk, the owners will erect a 100-ton plant.

W. S. Connor reports the discovery of new placer ground on Lynx Creek. The new ground is at the mouth of Accidental Gulch and Mr. Connor believes that it is an old channel of the creek.

Eighteen feet of water have accumulated in the

shaft of the Isle Royale at Helvetia. The water was struck in a cross-cut at the 300-foot level. If it proves that the body of water is permanent it will mean much for the future of Helvetia Camp. A cave similar to that found on the Copper Queen mine at Bisbee has been broken into, disclosing native copper and an abundance of water.

CALIFORNIA.

H. E. Finley and J. W. Calloway have a seventeen-foot ledge in the St. Patrick mine, near Ballarat, Inyo county. The ore is said to run about $20 a ton, with richer streaks.

The Riverside mine and mill, on the Gavilan grant in Riverside county, are running full time. The July clean-up was $2,680, netting $1,600, while that for August was slightly more.

The forty stamps of the Keystone Consolidated Co.'s mill at Amador City, Amador county, are now running steadily. Two five-foot concentrators are being put in for each battery. Affairs at the mine are in excellent condition.

The Ballarat company has let two contracts for work in their mine in Inyo county. T. H. Verencamp is the superintendent. The mill will probably be increased to forty stamps in the near future.

One hundred men have been put to work on the smelter site at Bully Hill, Shasta county. Superintendent Brown has reported that a railroad will be built at the Bully Hill by Captain J. R. De Lamar. The contract for rails and ties has been let. Surveyors are running grade lines over the hills and the work of construction will soon begin.

The latest story from the Coolgardie placer field, north of Barstow, according to the San Bernardino Transcript, has been received over the wire from Kramer. W. O. Lyon, a telegraph operator in the employ of the Santa Fe-Pacific Railroad at that point, has just returned from a six weeks' trip with a dry washer, during which time he saved $900 in coarse gold. He considers this very good remuneration for a two months' leave of absence, and it is probable that he will return to the fields and continue the work of dry washing instead of "jerking lightning."

Dover, Reyher & Dover, at Stone Corral, near Ballarat, Inyo county, have a four-stamp mill running on good ore from the Gold Note mine.

The Golden West Co., operating on the Comstock ranch, Tuolumne county, has encountered a fine body of ore aside from the present shoot now being developed. The new discovery is a ledge four feet wide, showing well the width of the vein. The old shoot is about 100 feet long, and is high grade. If the outlook continues promising a mill will be erected in the near future with steam for power, there being plenty of water for milling purposes. The work is under the supervision of F. R. Restano.

A. M. Dean has sold to Otto Ditfach a one-half interest in the Great Humboldt mine in the Pinecate district of Riverside county.

At the App mine, at Sonora, Tuolumne county, the ore bodies are opened up from the 1,000-foot level to the surface, and the outlook for this property is very flattering. It is the intention to put in an additional forty stamp at the mill, as the ore reserves fully warrant such an outlay. The timbers for the addition to the mill are now being secured.

R. E. Gilland has purchased from Frank Brown a one-eighth interest in the Major mine, south of Perris, Riverside county.

The mill at the Jumper mine, in Tuolumne county, has closed down on account of the scarcity of water. Fifty men have been laid off as a result. Timbering and development work will continue.

The inclined shaft at the Alpine mine, near Placerville, El Dorado county, is down 125 feet. A crosscut recently encountered a well-defined ledge of good pay ore.

The Buckboard mine has had sixty tons of ore milled at the Red Dog, which produced a gold brick worth $1,000, showing the ore taken out in the development work to run about $16.50 a ton.

A lot of eleven tons of ore from the Little Man mine, at Ballarat, Inyo county, owned by "Shorty" Morris, averaged $50 to the ton.

Assays from quartz lately taken out of the Dewey mine, in the Gazelle district, Shasta county, ran up to $500 a ton, with considerable ore in sight.

E. K. Stevenot of San Francisco has lately made a report on the Oriolo mine, near San Andreas, Calaveras county, for the Board of Directors.

It is believed that the extension of the famous Sheep Ranch vein has been found in the Ritter mine, four miles from that great property in Calaveras county.

The Riverside mill, at Carters, Tuolumne county, is running steadily. The reopening of the old mine has resulted in some rich rock being uncovered.

The old mill is to be again started on the Kimble mine, near Oroville, El Dorado county. Development work is being steadily prosecuted.

Development is to be resumed at once on the Gopher-Boulder property, in the Kelsey district, El Dorado county.

Fair progress is being made in the Over tunnel on Bald Mountain, Tuolumne county, the rim rock of lime having already been penetrated seventy feet. It is not thought that the belt will exceed 100 feet in width before a slate formation will be encountered.

Work on the Central Hill gravel mine, in Calaveras county, has been stopped on account of the lack of water, and no water can be secured now until the rainy season sets in. At the last workings, which were of a development character, a rather singular bank was left, disclosing a page in the history of this interesting river bed, which differs from any other yet found. Pure sulphur forms on the face of the bank in fungus-shaped exudations, and the little trickling stream from the bank is highly mineralized and of an extremely saline nature. Further along is seen the stump of a tree, rich in wood agate and specimens. This should be sent to the State Mining Bureau for exhibition.

The sinking of the incline shaft on the Minnehaha mine, near Logtown, El Dorado county, is still continued. The shaft is now about fifty feet in depth and good ore is being hoisted.

The mine in Lassen county, owned by Charles Littlefield, was recently bonded for $5,000.

The Mariposa Grant Co., with headquarters at Mariposa, in the county of the same name, is making arrangements to buy a twenty-stamp mill in Tuolumne county, to be put up at the Mariposa mine. If the mill being negotiated for cannot be secured, they will purchase a new ten-stamp mill. Sinking is to be resumed at once, and 200 feet more will be sunk on the mine.

The Red Dog mill, at Randsburg, Kern county, is milling between fifty and sixty tons of ore for the Butte Lode Mining Co.

The Confidence mine, at Sonora, Tuolumne county, will soon be running full blast. Retimbering the shaft is now in progress.

There are at present about 75 men employed at the Declez quarries, near West Riverside, in Riverside county, taking out rock for the San Pedro harbor breakwater. This force will soon be doubled. A grading outfit is now at the quarry, and several new sidetracks will be put in to untouched portions of the quarry.

A discovery of a large vein of good coal is reported at Santa Rosa, Sonoma county.

Tunnel No. 2 of the Hart Consolidated Co., near Garden Valley, El Dorado county, is now in the mountain about 175 feet. The owners expect to tap the ledge shortly.

The Kinyon mine, at Randsburg, Kern county, has been leased by Swartout & Jones, who are now clearing out the shaft.

The large boiler at the old Blanchard mine, on Weaver Creek, has been moved to the Ribbon Rock mine, on the mother lode, south of Placerville, El Dorado county. The boiler, which will furnish sixty HP., is nearly in place. Development work is being actively prosecuted at the mine.

W. A. Hoyt and A. S. White, the owners of the Golden Eagle, located a few miles beyond West Riverside, are still at work on the mine. They have men employed running a tunnel to crosscut the main ledge some distance below the surface croppings. The tunnel has now reached a depth of seventy-five feet, and is to be used as an entrance to the mine for transporting the ore to the surface.

The Val Verde, at Johannesburg, Kern county, has had 100 tons of ore milled at the Red Dog mill. The ore was taken out in the development of the property, which gives promise of being a steady producer.

The new twenty-stamp mill for the Mt. Jefferson property, at Groveland, Tuolumne county, is about completed, and operations will soon commence in earnest. A quantity of sulphurets is being hauled to Jamestown, to be shipped for treatment.

The new chlorination plant at the Shawmut mine, another of Tuolumne's bonanzas, is progressing favorably, the foundation having been laid, and the frame work placed in position. The mill on the property is not running.

An immense ledge of rich ore, said to be sixty feet in width, has been discovered by Mr. Walker of Menifee at Rosamond, Kern county.

Work is expected to commence shortly at the California Borax Works, near Searles, Kern county. The works are in splendid condition, and when started up there will be no necessity of an immediate close-down.

COLORADO.

The September output of the Cripple Creek mines was 35,000 tons, valued at $1,950,000.

John Grand of Detroit, Mich, has bought the Galena group of mines in Gilpin county from the Alpha Mining Co. He represents an English concern which will make other purchases and undertake mining operations on a large scale.

The Forest Hill Consolidated Mining Co. of Gunnison and the Canton & Pittsburg Mining Co. are developing claims on Forest Hill in Gilpin county. They own thirty-one claims consisting of 300 acres.

The option on the Camp Bird mine in Ouray county has been extended two months at the request of John Hays Hammond, who is examining the mine in the interest of an English concern. The final examination was made on September 22, and the extension of time was granted by J. W. Benson, general manager, representing Thomas F. Walsh, the owner, in order that the prospective purchasers might have a full opportunity to investigate the property. The price set was originally $15,000,000, but the extension of the option will make the property cost the Englishmen an additional million if Mr. Walsh has his way about it.

The strike at Stratton's Independence, caused by the announcement that the men would be obliged to change their clothing after leaving the mines in order that they might be searched for stolen treasure, was settled by a compromise by which only those who are actually suspected of stealing will be obliged to submit to examination.

IDAHO.

The Iola mine at Warren is being worked with considerable success by the lessees. It has a ten-stamp mill. At the same place, the Rescue is being pumped out by the Idaho Consolidated Co., which intends to open the ore bodies in the lower levels and sink as far as the present hoist and pump will permit.

The Daisy mine at Quartzburg is producing ore that mills $100 a ton and has a five-stamp mill running steadily.

Report comes from Idaho City that the large properties of the Atlantic Gold and Silver Mines, a company of Englishmen, have been purchased by J. C. Johnson of Lincoln, Neb. The mines will soon be opened up extensively. The Atlantic lode is one of the largest in the west, running from 100 to 250 feet in width, and having been tested to the depth of 1,600 feet by tunnels.

MONTANA.

On a mine owned by R. A. Bell of Helena, situated twelve miles from Helena, a wonderfully rich strike has been made. The mine is known as the East Pacific. It is declared that the present strike runs from $30,000 to $40,000 gold a ton. The strike was made while drifting tunnel No. 4, which is now more than 2,000 feet below the surface, while making a drift at a depth of about 900 feet. It is evident that the ore increases in value with the sinking. Mr. Bell claims to have found pieces of ore which are at least one-half solid gold. Before this strike the East Pacific had produced upwards of $1,500,000 in gold. It is believed that the East Pacific's ore shoot is one of the longest in the west, the pay shoot in tunnel No. 4 being over 2,500 feet long. While the vein is not wide, its length makes it a most remarkable discovery. The ore is sometimes of low grade, but the average is so high that the mine is certain to be a wealth producer of the first order.

The Barden tract in the Helena copper district has been bonded by F. Aug. Heinze for $15,000.

O. P. Chisholm of Bozeman has taken a bond on the coal lands of Conrad & Cooney in Gallatin county, the price being $125,000. The coal is semi-anthracite and well adapted for smelting and domestic purposes.

In the Kearsarge mine, Madison county, a valuable strike has been made. Smelter returns show a high percentage of gold. In the General Shafter

mine, adjoining the Kearsarge, a three-foot vein of high-grade ore has been found.

In North Helmville, Deer Lodge county, a lively copper camp is springing up. An ore body sixteen feet wide and quite rich in copper has been encountered by Russell & Co. sixty-five feet down. Ore running about $75, with concentrates $200 in gold and lead has been found at the Ptarmigan mine in the same vicinity.

SOUTH DAKOTA.

Twenty additional stamps have been ordered by the Homestake Company of Lead for the Caledonia mill at Terraville, which will be ready for ore within a month. An extension is being made on the Black Hills and Fort Pierre Railroad down to the mill. The De Smet's machinery for its new hoisting plant is on hand, and the starting of these two old mills by the Homestake company will call for the work of 600 men.

Wisconsin capitalists have bonded the Yellow Bird mine in the Hornblende district and are running a long tunnel to tap the main ore vein. A hoisting plant will be erected. The ore runs from $18 to $120 a ton in free gold.

A. D. Ticknor, owning properties in the Bear Gulch district, has made a rich discovery of free milling ore on his claims. One assay runs as high as $5,660 a ton.

The Big Bend Mining Co. is working a placer on Rapid River below Pactola and is cleaning up nearly $1,000 a day in gold. D. C. Sherman of Pactola is associated with two New Yorkers on the work. A steam dredge is now at work on gravel carrying about fifty cents in gold to the cubic yard.

The Pluma chlorination works will soon be started by the Horseshoe Mining Co., which has discovered a large body of ore at Terry.

UTAH.

Settlements of $2,153,485 were made in the ore and bullion market at Salt Lake City in September. This is the record figure for any single month of this year. In the total is included the Consolidated Mercur's first shipment of gold bullion, forwarded on September 15 and valued at $182,446, also the $30,000 product of the cyanide plants that passed through the gold sampling rooms of the American Smelting & Refining Co. Ores forwarded by individual buyers and the copper, gold and silver bullion amounting to 431,000 pounds, forwarded by the Highland Boy to eastern refineries would add about $200,000 to the total.

The Horn Silver Mining Co. has issued a report showing that it has marketed in the past year 150,000 tons of crude ore and concentrates with a total value of $600,000. The company will close its anniversary with over $250,000 in the treasury. A feature of the next year's business at the mine will be the handling of the zinc ores.

WASHINGTON.

The Palmer Mountain tunnel is now 2,650 feet in length and is growing at the rate of 130 feet every thirty days. The enterprise appears to be most successful, and the operators are now trying to determine the most advisable manner and method of treating the large bodies of ore. So far as quantity and depth go there is no longer any doubt.

A strike has been made in the Anaconda group in Becker River district which has been bonded by eastern capitalists. The ore body is about fifteen feet wide, with gold and copper values from $30 to $60.

A discovery of anthracite coal is reported in Snohomish county, sixty miles from tidewater. The extent of the coal bed is not yet known.

The two mills in Slate Creek district are working on the ores of the Eureka and Mammoth gold mines. It is likely that the mills will run throughout the winter, for there is an abundance of ore on hand which would take the full attention of several mills of much larger capacity.

IRON AND STEEL

PRESSED STEEL CAR BUSINESS: President Schoen of the Pressed Steel Car Co. is quoted as stating that his company recently took contracts within eight days for steel cars approximating in money value nearly $7,000,000.

SHIPMENTS FROM DULUTH: The shipments of iron ore from the head of the Lakes, for the season to October 1, were 7,582,969 gross tons, as compared with 5,918,309 tons for the corresponding period last year, an increase of 1,664,660 tons. The shipments for the month of September were 1,682,552 tons, as compared with 1,058,628 tons for the same month last year.

STEEL SHEET COMPANY MOVING TO NEW YORK: October 13 was the date set for the removal of the operating offices of the American Sheet Steel Co. from Pittsburg to New York City. The New York headquarters of this company will be in the Battery Park Building, where the American Tin Plate Co., the American Steel Hoop Co. and the National Steel Co. are already located.

DISSATISFIED RAILROADS: Certain railroad interests have been dissatisfied with the price of rails as fixed by the rail makers' pool, and have been insisting that $22 a ton should be the price instead of $26. It has been said that President James J. Hill had called a meeting of railroad presidents to take joint action on the matter. Mr. Hill denies that he has called such a meeting or has even heard of such a meeting. President Cowen of the Baltimore & Ohio, President Truesdale of the Delaware, Lackawanna & Western, and several other railroad officials deny that they have heard of any such meeting. Carnegie officials are also quoted as denying the report that that company was likely to reduce the price of rails, and say it has positively determined to maintain the $26 rate.

STEEL AND WIRE DIVIDENDS: The following is a statement of a director of the American Steel & Wire Co. concerning the statement attributed to Mr. Gates that the payment of dividends on the common stock is a mistake:—"I do not believe that any director of the American Steel & Wire Co. made the statement that the payment of the dividend on the common stock was a mistake. The earnings last year were so large that after paying out the $2,800,000 dividend on the preferred there was $10,000,000 left, and if a company issues common stock, the holders of that common stock are entitled to their share in good years. This year the dividend on the common and preferred stocks was actually earned in the first six months for the entire year. In July and August business was light, but in September the volume of business has been larger than last year and probably beats all records. At this rate the present large holdings of raw materials, as well as the finished goods will be soon turned into money, and nobody can tell at the present time what the company will do regarding the dividend on the common stock next March, the dividend for January having already been declared in February. The demand for all wire is exceedingly good, and the condition of the company is just as good to-day as when insiders declared the stock cheap at fifty. Regarding opposition, there is some opposition in the wire trade to-day, and it is only to the interest of the company that there always should be. The country is growing, exports are growing and there is enough business for a few other companies if they start up."

COMPETITION BETWEEN BIG STEEL COMPANIES: In the division between the various large combinations that have been formed during the last few years in the iron and steel trade there has been no exact separation of the various branches of such manufacture. Bradstreets' in a recent editorial article says that several of the companies created by a union of different plants compete with each other in the production and sale of certain classes of products, and the rivalry arising from this and the cutting of prices by the different companies has been among the serious difficulties with which the large iron and steel industrials have had to contend. A recognition of this fact is afforded by a rather curious deal which, it is announced, has just been effected between the Republic Iron & Steel Co. and the American Sheet Steel Co. Under an arrangement recently effected, the American Sheet Steel Co. is to abandon the departments of some of its plants which have heretofore been engaged in the manufacture of bar iron and to transfer the same to the Republic Iron Co. On the other hand, the Republic Iron & Steel Co. exchanges for the above establishments certain portions of its properties at which steel sheets were made, and turns them over to the American Sheet Steel Co. either to operate or dismantle, as may be deemed most advantageous. It is, of course, hardly possible that any general tendency to make exchanges of this kind will result, but the conclusion may be drawn that managers of large industrial combinations are inclined to diminish the number of points at which unnecessary competition could arise between the various concerns.

COLORADO FUEL AND IRON AFFAIRS: Says President Osgood—"The general business situation in the far West, as I see it, is excellent. In the case of our company the coal and coke business is the largest ever known. The demand is very large and requires our best exertions to meet it. The steel business of the company has doubled in the past thirty days, and while prices are still low the tendency is stiffer, and the outlook, so far as we are concerned, is encouraging. I look for a healthy business after the election, provided Mr. McKinley is re-elected. The railroads in the West are so prosperous that I am confident they will be large purchasers of rails. The new price is undoubtedly satisfactory to most railroad presidents. The steel rail industry is a large one, and directly related to many other large industries, and it is therefore not to the interest of the railroads to see abnormally low prices for rails. Furthermore, if the price of rails be made unduly low it encourages reckless competition in the way of new railroad construction. Then, too, a low price for new rails means that railroads get so much less for old material. The difference between $26 per ton and $23, which I understand was the figure predicted by some, is only about $300 per mile for an ordinary road. With the ability of most railroads to borrow money this would mean only about $12 a year per mile added to fixed charges. It is not reasonable to suppose that this difference would deter railroads from putting down new rails when needed. It may also be worth stating that if ocean tonnage could be secured a ready export market could now be found for rails at present prices."

COAL AND COKE

PACIFIC COAST CO.'S BUNKERS BURNED: On September 22 the coal bunkers of the Pacific Coast Co. at Astoria were completely destroyed by fire. They contained at the time between 600 and 700 tons of coal. The loss is estimated at $30,000.

ACTIVITY AT CAPE BRETON: Charles Fergie is directing extensive operations in the coal beds of Mackenzie & Mann at Broad Cove, on the northwest coast of Cape Breton. It is estimated that these properties contain at least 100,000,000 tons of workable coal, equal in quality, it is believed, to that of the Dominion Coal Co., and the seams are favorably situated for shipping. Mr. Fergie expects to have one mine fully equipped and in active operation within a year.

LEHIGH VALLEY CO.'S PRIZE: The Lehigh Valley Coal Co. received the highest prize in the gift of the judges at the Paris Exposition for its display. The exhibition included a reproduction of the company's No. 40 shaft and breaker as they actually exist at the mine. There were also specimens of the different varieties of coal mined and many other interesting features. The judges accompanied their prize by a note complimenting the company and its officials for the novelty and completeness of their display.

COAL OUTPUT IN 1899: Edward Parker of the Division of Mines and Mineral Resources of the United States Geological Survey, has just made public his report on the coal production of this country during last year. The report shows that 1899 was by far the most remarkable in the history of the United States coal mining. The production was larger than ever before by nearly 34,000,000 tons, and prices were greatly improved in all sections of the country. The production of anthracite was 53,944,647 tons, an increase of 2,161,525 tons over the record of 1895, the highest production reported hitherto. The production of bituminous coal was 172,608,917 tons. This figure surpasses all previous reports and puts this country at the head of the world's coal producers. The increase was 33,765,325 tons, or 15.35 per cent over 1898 and 53,518,327 tons, or 26.73 per cent over 1897. Comparing the product in 1899 with some of the earlier years of our history, a still more remarkable advance is shown. In 1889 our total production of coal was 141,229,613 tons, showing an increase in ten years of 112,510,379 tons, or nearly eighty per cent. In 1879 our production amounted to only 66,452,960 tons, compared with which the output in 1899 shows an increase of about 288 per cent, while in thirty years the production has increased about 700 per cent, the yield in 1899 being eight times that of 1869, one generation ago. In the same period the production of Great Britain has about doubled, that of Germany has been multiplied by four, and that of France by 2.6. In 1869 the total product of Great Britain was nearly four times that

of the United States, and that of Germany exceeded ours by about twenty per cent. In the bituminous trade the production and consumption were limited only by the ability of railroads to furnish the cars and provide the means of hauling them, and in some cases by the ability of operators to secure the labor sufficient to keep the tonnage up to the demand. It was the first time in many years that the productive capacity of the bituminous mines was not in excess of the market requirements for at least a portion of the year. The wonderful activity which prevailed throughout the year in the iron and steel trades created a demand for coke that kept practically every available oven in the country operating to its full capacity and taxed the railroads entering the coking districts to provide transportation for the output. The entire year was one of remarkable activity in all branches of the coal business and will have a notable place in the history of the trade. One of the effects of the enormous increase in production was the placing of the United States ahead of Great Britain as the leading coal producer of the world.

THE METAL MARKETS.

General Review and Forecast of Trade Conditions

Silver Strong — Copper Quiet but Firm — Tin Apathetic — Lead Firm — Spelter Active — Steel in Suspense—Coal Waiting.

On the editorial page we discuss at some length the recent history of the silver market and the probable course of the same in the next few months. The position taken there is that the producers of silver may reasonably expect to receive for their product better prices on the average than they have enjoyed for several years. The advance has been gradual and legitimate, without speculative features; and the same commercial causes that have caused and supported the advance are still operative, having by no means spent their force. On the 12th inst. the commercial price of bar silver was 63¾. Mexican dollars stood at 50¼.

COPPER QUIET, BUT STEADY.

Not for a long time has the copper market developed so little activity as during the last two weeks. No weakness has resulted from the comparative quiet, and the general tone has been consistently firm. Probably the near approach of the election period and the natural disposition of manufacturers to move slowly at such times account for the limited dealings in this staple. The best opinion still appears to favor high prices for the metal in the next few months; and even large consumers, whose interest it is to think and talk bearishly, do not now in private discussion express hope of an early return to lower values. They seem to be basing their calculations for the next year on the present range of copper values. Our latest quotation for lake copper was 16.87½c., and for Electrolytic, 16¾c.

THE MINOR METALS

Tin reacted with some vigor from the extreme depression of last month, but it did not hold the advance, and the buyers seem to have no fear of the market. They are covering only their immediate wants, and are satisfied to let the future take care of itself. The closing price was 28½c.

Lead continues in good demand, and considerable quantities of the metal are passing steadily into consumption. For the first eight months of the year the Treasury Department reports imports of lead into the United States as 132.3 million pounds, as compared with 146.2 in the same period last year. Our re-exports of foreign lead refined here, however, were 105.8 million pounds this year, as compared with 125.3 last year. The net balance of imports, therefore, this year was 26.5 million pounds, as compared with 20.9 last year. We report the current price of lead as 4.35 New York and 4.27½ St. Louis.

Spelter is moving freely at fair prices. The European market continues strong, and exports are heavy. We report the current price as 4.10c. New York, with St. Louis about fifteen points lower.

IRON AND STEEL.

The iron market is in an unsatisfactory condition owing partly to the deadlock caused by the disposition of the railroads not to accept the $26 price for steel rails named by the combination, and partly to the policy of conservative caution that is naturally followed by the great iron and steel industries in an ante-election period. Prices are inclined to sag under the conditions described, and in some articles the lowest prices yet recorded in the present decline have been made in the last few days. It is unlikely that any decided change for the better will occur until the election is over. By that time the steel-rail problem will have been solved in all likelihood, and in other respects the way will have been cleared for an early resumption of activity. The latent demand of the country for iron and steel in all forms is undoubtedly enormous, and the best judges look for an era of fair prices and great activity in every department of the iron industry

COAL AND COKE

It is hardly worth while to discuss this market until the anthracite strike has been settled. At this writing it is expected that a settlement will have been made by the time this matter is in print, although some little time will be required at best for the machinery of production to attain its normal efficiency. It looks now as if the miners would be successful in their demand for increased wages, and if so the consequent higher prices to consumers may curtail sales somewhat. On the whole, however, the outlook is fair for a winter of activity and profit to anthracite operators.

The bituminous branch of the industry continues to flourish. It is profiting from the troubles in the anthracite region, and the only difficulty that producers have is to obtain cars enough to fill their orders.

NEW INCORPORATIONS.

COLORADO.

SALVADOR GOLD MINING AND MILLING CO., Denver; $300,000; H. K Chittenden.

NORTHWESTERN OIL & COAL CO., Colorado Springs; $1,000,000; W. W. Shemwell

IDAHO SPRINGS GOLD PRODUCING CO., Idaho Springs; operating mines, etc.; $250,000; R. Marshall.

COLORADO MINES CO., Denver; $2,000,000; F. Rickey.

DOROTHY GOLD MINING CO., Cripple Creek; $1,500,000; H. M. Sprague.

PIONEER LYNN MINING CO., Denver; $100,000; C. W. Grose.

NORTHAMPTON GOLD MINING & MILLING CO., Cripple Creek; $1,000,000; A. T. McDill.

CHICAGO MINING & LEASING CO., Chicago; Ill.; $500,000; W. M. Wemott.

RENO MINING CO., Mineral, Wyo., $25,000; G. C. Dewey.

KITTIE M. MINING & LEASING CO., Cripple Creek; $100,000; S. C. Cummings.

AMERICAN EAGLE MINING CO., Georgetown; $100,000; W. H. Pease.

GARBUTT MINING CO., Leadville; $10,000; I. Mortonson.

CHARTER OAK CHANCELLOR MINING & MILLING CO., Georgetown; $50,000; W. H. Maxton.

MISER GOLD MINING & MILLING CO., Denver, $1,000,000; A. Ross.

YOUNGSTOWN MINING CO., Fair Play; $500,000; C. E. Semple.

AUROGENTUM MINING CO., Leadville; $100,000; L. H. Weber.

EVALYN MINING & LEASING CO., Leadville; $500,000; J. H. Fletcher.

NEW MEXICO SMELTING AND REFINING CO., Denver; smelting and refining business; $1,000,000; A. J. Frank.

LORD BYRON MINING CO., Georgetown; $500,000; W. M. Giller.

THERESA MINING & LEASING CO., Denver; $10,000; D. E. Parks.

SOUTH WINNIE LEASING & MINING CO., Leadville; $250,000; L. F. Long.

ENGLISH-AMERICAN GOLD MINING CO., Cripple Creek; $1,250,000; E. Yokel, Chicago, Ill

MAJOR GOLD MINING & MILLING CO., Boulder; $200,000; M. H. Davis.

LATSHAW MINING, TUNNEL & MILLING CO., Buena Vista; $2,000,000, I. M. Latshaw.

COLORADO SPRINGS COPPER MINING & TUNNEL CO., Colorado Springs; $25,000; D. A. Russell.

FIRST NATIONAL GOLD MINING CO., Denver; $100,000; F. I. White.

GOLDEN AGE NO. 2 MINING & MILLING CO., Boulder; $250,000; D. Mowery.

OREGON & BOSTON MINING CO., Boston; $500,000; E. A. Kingman.

KOKOMO PIONEER MINING & MILLING CO., Idaho Springs; $1,000,000; F. L. Burton.

QUARTZ MINING & MILLING CO., Silverton; $100,000; E. P. Watson.

SNOWSHOE GOLD MINING CO., [illegible] $5 0,000; A. J Menahan.

LING GOLD MINING CO., Boston, Mass; $100,000, G. W. Flynn

COLORADO CITY MINING & LEASING CO., Colorado Springs; $10,000; R. S. Briscoe.

REILING GOLD DREDGING CO., Colorado Springs; $150,000; H. J. Reiling.

DELAWARE

LA TRINIDAD MINING & MILLING CO. OF MEXICO, Wilmington; $500,000; A. A. Watte.

OAXACA MINING & INVESTMENT CO., Wilmington; $500,000, M. S. Stout, Denton, Tex.

NATIONAL SMELTING CO., Dover, smelting business; $500,000; A. W. Gilliland, St. Louis, Mo

BINGHAM CONSOLIDATED MINES CO., Dover; $850,000; J. Virdin.

INDIANA.

GREEN HILL COAL & MINING CO., Sullivan, mine coal; $500,000; D. Mathews, Columbus, O.

RIVERSIDE MINING & MILLING CO., Greensburg; operate mines and water power; $60,000, G. L. Roberts.

GLEN OAK COAL MINING CO., Terre Haute; operate coal mines; $20,000; S. Bagle

BLOOMFIELD MINING, GAS & OIL CO., Bloomfield; mine coal and sink oil and gas wells, $5,000; L. H. Jones.

JOHNNY BULL MINING CO., Lafayette, mine lead and zinc; $50,000; E. V. Burt.

MAINE.

AMERICAN MINING & METAL EXTRACTION CO., Portland; $200,000; J. J. Henry, Boston, Mass

DEER CREEK GOLD MINING & MILLING CO., Portland; $10,000,000; R. L. Lee, Plainfield.

ST. REGIS ADIRONDACK GOLD MINING CO., Portland; $200,000; H. P. Abecorn, Boston, Mass

TOURMAL GOLD MINING & MILLING CO., Portland; $150,000; J. E. Kilduff, Boston, Mass.

THOMAS STRAHAN CO., Portland; $150,000; G. H. Smith, Arlington, Mass.

HOPE GOLD MINING CO., Portland; $200,000; G. H. Gould.

MICHIGAN.

KENDRICK GOLD MINING CO., Detroit; $100,000; E. D. Williamson.

EARL MINING & SMELTING CO., Detroit; $50,000; J. G. Ferguson.

MINNESOTA.

MINNEAPOLIS MINING & DEVELOPMENT CO., Minneapolis; $50,000; H. C. Peterson.

MISSOURI.

SWANSEA COPPER CO., St. Louis; $250,000; D. G. Gibson, Webster Groves.

CLIFF LEAD & ZINC MINING CO., Joplin, $12,000; H. Crossman.

GRANITE MINING CO., Webb City; $50,000, J. G. McRoberts.

MARION MINING CO., Joplin; $50,000, J. W Allen.

CLEAR-MOORE LEAD, ZINC & REALTY CO., Pioneer; $200,000; F. Clear, Joplin.

MANANITA MINING CO., Kansas City; $5,000; C. L. Merry.

BEN FRANKLIN ZINC MINING CO., Joplin; lead and zinc mining; $50,000; F. P. Fairchild

NEW JERSEY.

GOLDSTONE MINING & MILLING CO., Jersey City; $300,000; P. Whitney.

GOLDEN GRANT MINING & MILLING CO., Camden; $1,000,000; G. W. Mark.

ELWOOD MINING & MILLING CO., Jersey City; $100,000, H. G. C. Thornton, Cranford, O.

PORCUPINE MOUNTAIN COPPER CO., Jersey City; $2,500,000; T. C. Bates, Worcester, Mass.

PANAL PLACER CO., Jersey City; $250,000; F. L. Patton, Jr.

PENNSYLVANIA

JAMES McNEIL & BRO. CO., Pittsburg; manufacture iron and steel; $150,000; T. McNeil, Sr

TEXAS.

TEXAS COAL & MINING CO., Austin; mining coal; $50,000; William H. Stacy.

WASHINGTON

NORTH STAR MINING CO., Seattle; $1,000,000; A. Fraser.

AENEAS VALLEY GOLD MINING CO., Republic; $100,000; J. W. Sneed.

BRIGHT SPOT GOLD MINING CO., Wheeville, Wis.; deal in mines, smelting works, etc., $1,000,000, R. Boelticher.

GREAT WESTERN COPPER CO., Spokane; $15,000; A. S. Dibble

UNITED STATES CONSOLIDATED MICA MINING CO., Spokane; $250,000; A. Munro, Idaho.

MINING STOCK QUOTATIONS IN VARIOUS MARKETS

Mining stocks multiply fast—rapidly, and we cannot undertake to keep track of them all. We keep however, complete records of all mining stocks—active or inactive, and we shall be glad to furnish any subscriber, on request, with detailed information about quotations. The prices given below are in most cases those current at the close of business on the day we go to press—two days before the date of issue.—*Mining and Metallurgical Journal*

BOSTON.

Adventure	4 50	Old Colony Cop	3 00
Allouez	1 50	Old Dominion	26 00
Arcadian	—	Osceola	64 50
Arnold	18 00	Parrott	44 00
Atlantic	4 25	Quincy	143½
Bingham	22 50	Rhode Island	3 50
Bonanza	21 50	Santa Fe	6 00
Brunswick	11 00	Santa Ysabel	—
Butte	—	Tamarack	233 00
Boston & Mont	323 00	Tecumseh	—
Butte & Boston	61 00	Tri-Mountain	8 75
Calumet & Hecla	755 00	Victoria	2 00
Centennial	15 50	United States	—
Copper Range	85 00	Utah Con	30 25
Daly	18 50	Winona	7 50
Dominion Coal	38 50	White Knob	13 00
Franklin	14 00	Winona	2 50
Isle Royal	30 00	Wolverine	49 50
Merced	—	Wyandotte	—
Mohawk	18 00	Zinc	9 00

NEW YORK.

Adams Con	—	Golden Fleece	25
Ama	32	Gould & Curry	32
Alice	50	Hale & Norcross	31
Amalgamated	87 00	Horn Silver	—
Anaconda C	43 50	Iron Silver	68
Anaconda G	45 00	Isabella	1 11
Argentum	20	Jack Pot	—
Best & Belcher	34 00	Julia Consol	—
Bullion	—	King & Pemb	—
B. & C. Col	11 50	La Crosse	—
Bon Accord	20	Leadville	07
Caledonia	41 00	Little Chief	18
Cenalpa	—	Mexican	34
Challar	—	Mollie Gibson	20
Chrysolite	03	Moulton	—
Con. T. stock	—	Mount Rosa	55
Con. T. bonds	—	Occidental	—
Con. T. scrip	—	Ontario	—
Con. Cal. & Va	1 25	Ophir	55
Cr. & Cr. Creek	12	Pharmacist	13
Crescent	—	Phoenix	14
Crown Point	02	Pinnacle	18
Crœsus	—	Plymouth	15
Crown Point	—	Portland	3 15
Damon	17	Potosi	23
Deadwood Ter	50	Quicksilver	—
Elkton	—	Quicksilver pr.	7 50
Eureka Con	—	Savage	18
Fath De Smet	—	Sierra Nevada	35
Findlay	15	Small Hopes	80
Garfield	08	Specimen	—
Standard	4 00	Utah	—
Tornado	—	Victor	—
Union	11	Work	4½
Union Con	13	Yellow Jacket	24

NEW YORK INDUSTRIAL STOCKS.

Amer. Smelt	37 50	Nat. Lead pf	90
Am Smelt. pf	88 75	Penna Steel Car	38 00
Am S. & W	3 75	Pr'ss S'el Car pf	75 25
Am. S. & W. pf	23 00	Republic I	11 50
Col. F. & I	1 50	Republic I. pf	52 00
Fed. Steel	44 75	Stand. Oil	542 00
Fed. Steel pf.	94 50	Tenn. C. & I	66 50
Nat. Lead	18 00		

TORONTO.

Athabaska	03 50	No Belle	—
Big Three	—	Olive	10¾
B. C. G. Fds	—	Republic	76
Crow's Nest	—	Van Anda	—
Dardanelles	02	Virtue	60
Deer Trail No. 2	03¾	War Eagle	1 51
Fairview	02¾	Waterloo	02½
Golden Star	06¾	White Bear	02¾
Knob Hill	50	Winnipeg	06
Minnehaha	—		

COLORADO SPRINGS.

Acacia	37¾	Independance	43
Alamo	12	Ingham	18½
Anaconda	13	Isabella	86½
Anchoria	60	Jack Pot	53
Argentine	20	Keystone	14½
Bankers	16	Lexington	13½
Battle Mount	25	Mary Cashen	13½
Blue Bell	13	Matoa	17
C. C. Con	12	Mexia Anchor	36
C. C. & M	16	Mount Rosa	53
Columbine	53	Nevada	08
Damon	17	Nougat	21
Dante	60	Ophir	37
Elkton	1 72	Orphan	16½
El Paso	41	Pharmacist	11½
Findley	15	Pinnacle	17
Garfield	08	Raven	—
Gibson	26	Rawlings	25
Gold Coin	6 00	Specimen	—
Golden Fleece	20	Tomboy	—
Gold King	1 12	Tornado	—
Gold Knob	12	Union	11
Gold Sovereign	07	Vindicator	1 23
Gould	32	Work	23½
Hard	18	Zenobia	12½

SALT LAKE.

Accuser	—	Last Dollar	06
Ajax	46	Low Mam'oth	44
Alice	56	Little Pittsb'h	06½
Bullion Beck	4 00	Mammoth	2 20
Cent. Eureka	10 00	Mercur	—
Chloride Point	—	May Day	43
Daly	1 75	North Light	06
Daly West	10 00	Omaha	—
Dalton & Lark	—	Ontario	5 62½
Dalton	05	Petro	—
Dexter	1 25	Rich Anaconda	—
Daisy	02½	Sunshine	—
Eagle	—	Swansea	4 00
Eagle & Blue Bell	65	Sc. Swansea	1 25
Emerald	—	Sunbeam	32
Four Aces	02	Sacramento	33½
Geyser-Marion	—	Silver King	58 00
Galena	15	Star Consol	1 05½
Grand Central	5 05	Shower Con	—
Gold on Eagle	—	Tetro	—
Horn Silver	1 25	Utah	80
Homestake	—	Valeo	10½
Ingot	—	W. M'f'n Placer	—
Joe Bowers	03¾	Yankee Con	20

SPOKANE.

Ben Hur	—	Morning Glory	07¾
Black Tail	—	Mountain Lion	58
Butte & Boston	—	Pearl	—
Deer Trail No. 2	04	Princess Ma'de	02
Golden Harv'st	—	Quilp	15
Insurgent	—	Republic	80
Jim Blaine	10	Tom Thumb	20
L. Pine Sur. Con	09		

SAN FRANCISCO.

Alpha Con	05	Kentucky Con.	03
Alta	02	Lady Wash Con	03
Andes	09	Mexican	37
Belcher	17	Occidental	09
Best & Belcher	36	Ophir	80
Bullion	05	Overman	10
Caledonia	41	Potosi	24
Challenge	20	Sag Belcher	06
Chollar	25	Savage	32
Confidence	75	Sierra Nevada	36
Con. Cal. & Va	1 25	Standard	7 90
Con. Imperial	01	St. Louis	15
Crown Point	13	Syndicate	04
Gould & Curry	70	Union Con	13
Hale & Norcross	38	Utah Con	24
Julia	03	Yellow Jacket	24
Justice	07		

MEXICO

Name of Company.	State.	Price.
Amistad y Concordia	Hidalgo	8 22
Angustias	Guanajuato	112
Arevalo y Anexas	Hidalgo	200
Asturiana y Anexas	Zacatecas	90
Barranlon y Cabras	Durango	30
Bartolome de Medina	Hidalgo	70
Cabezon y Anexas	Zacatecas	15
Candelaria de Pinos	"	220
Capuzaya	Durango	12
Carmen	Hidalgo	200
Cinco Senores y Anexas	Guanajuato	220
Concepcion y Anexas	S. Luis Potosi	270
Coronas	Mexico	165
El Oro	Guanajuato	—
El Oro pref	Guanajuato	—
Esperanza y Anexas	Mexico	1,030
Gloria	Chihuahua	—
Guadalupe	Guanajuato	200
Luz de Borda y valdo	Michoacan	20
Luz de Maravillas	Hidalgo	100
Palacios	Durango	20
Palma de Bomb	Zacatecas	30
Pinales	Durango	—
Rafael y Anexas	[illegible]	[illegible]
Real del Monte	[illegible]	[illegible]
Restauradora	[illegible]	30
Rosario y Anexas	Durango	[illegible]
San Francisco	Hidalgo	80
San Rafael Offerd	Hidalgo	405
San Rafael assessable	Hidalgo	800
Sto. Maria de la Paz	S. Luis Potosi	805
Soledad	Hidalgo	230
Sorpresa	"	200
Trinidad Aviador	Guanajuato	—
Trinidad Aviado	Guanajuato	7
Tlauzingo	Puebla	—
Union Hacienda	Hidalgo	240
Zona Min. de Paz	Guanajuato	8

NOTE—Mexican stocks are figured on the basis of Mexican silver

PORTLAND IMNAHA COPPER MINING CO., Spokane; $1,500,000; F. H. Sanders.

BERT CHANGE MINING CO., Seattle; $1,500,000; A. W. Hager.

LAKE CHELAN COPPER CO., Spokane; purchase and lease mining lands; $10,000; W. Truitt.

HOME MINING CO., Cle-Elum; $200,000; T. Johnson.

SILVER BUTTE MINING CO., Tacoma; $10,000; H. E. Huatvold.

MINERAL HILL CONSOLIDATED CO., Spokane; $700,000; J. R. Boysell.

CEDAR VALLEY GOLD MINING CO., Spokane; $50,000; L. K. Armstrong.

ELWELL DARRINGTON MINING CO., Seattle; $1,000,000; J. A. Elwell.

LUCKY EIGHT MINING CO., Seattle; $1,200,000; J. E. Lowry

CANADIAN AMERICAN MINING CO., New Whatcom; $2,500,000; J. E. Nitchell.

RICHARD R. MINING CO, Spokane; $50,000; W. C. Dice

VIOLET MILLING & MINING CO., Seattle; $1,500,000; J. M. Roberts.

DIXIE QUEEN GOLD MINING CO., Spokane; $1,000,000; W. H. Plummer.

TEARAWAY MINING SYNDICATE, Seattle. $250,000; R. A. Barru.

GEORGIE REED MINING CO., Spokane; $150,000; J. W. Graham.

SANGER DEVELOPMENT CO., Walla Walla; $40,000; W. M. Moore.

MILWAUKEE PALMER, MOUNT GOLD & COPPER TUNNEL CO., Wehesville, $6,000,000, J. J. Hughes, Seattle

MARIETTA MINING CO., Everett; $1,500,000, W. R. Steckbridge

WEST VIRGINIA.

LONE PINE MINING CO., Prescott, Ari.; $3,000,000; F. Evans, New York City

FAIRMONT COAL MINING CO., Fairmont, general coal and coke business; $1,000,000. A. B Fleming.

PLEASANT VALLEY MINING & MILLING CO., Boston, Mass.; $40,000; W. P. Jackson.

CENTER GOLD & COPPER MINING CO., Center, N. C. $250,000. J. V. Brady, New York City

WANTED

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, for all paid-up annual subscribers.

Other than above, 20 cents a line.

Advertisements not accepted for less than one month.

ASSAYERS AND MINERS to correspond with us in regard to Minerals and Crystal Groups for Cabinets. Best prices paid for fine cabinet specimens.

ROY HOPPING,
129 4th Ave., N. Y.

CAPITALIST or Promoter required to form company to purchase and operate fifty miles of gold dredging territory (not Yukon). Estimated value per cubic yd., 30 to 60 cents; estimated cost per cubic yd., 3 to 5 cents; estimated amount of auriferous gravel, 70,000,000 cubic yds. Address, "N. W. T.," New York Office, M. and M. Journal.

CHEMIST desires position in commercial laboratory or technical works. Best of references as to professional and business ability. J. W. FELL, Asheville, N. C.

A MINING engineer, with camping and assay outfit, would be glad to join a prospecting party on reasonable terms. Address, PROSPECT, Mining and Metallurgical Journal Office.

PARTNER required in active management very extensive gold dredging interests. Price of share, $20,000. References exchanged. Placer engineer preferred. Address, CANADA, New York Office, M. and M. Journal.

EXPERT hydraulic and steam engineer, experienced in transmission of power by electricity, desires position (Colorado or Montana preferred) as superintendent of mining power plant. Address,
E. S. C., Mining and Metallurgical Journal.

WANTED.—Position as superintendent by pushing and up-to-date mining engineer, who understands all branches of mining and milling gold ores. Has his own assay outfit, and would be willing in a small mine to do the assaying and surveying. Address,
D. P. A., Mining and Metallurgical Journal Office.

GEORGIA GOLD MINING.—Party long experienced in mining and milling desires co-operation for handling choice exploited property secured by lease-option. Very small amount needed. Correspondence solicited. MINER, 24 Ellis St., Atlanta, Ga.

SITUATION WANTED.—A competent and experienced mill man desires position on concentrators or batter frame. Highest references. Address, L. W., 509 Kearny St., Room 2, first floor, San Francisco, Cal.

AN EXPERIENCED assayer and bullion refiner with the best of references, several years' experience, and a university training, desires employment with some mining company. HAROLD FRENCH, Los Angeles Office, M. & M. Journal

WANTED: PARTNER or Co. to open coal mine near RANDSBURG. Three veins, the third being nine feet, four feet solid coal, 101 feet from surface. Two first viens opened with shaft. 1,600 acres discovered along the rim of field.
F. H. HEALD, Randsburg, Cal.

ENGINEER and Metallurgist of long experience, fearless, energetic, trustworthy, seeks position; managing, erecting, reporting or developing. Speaks French, German, Spanish and excellent Chinese. Exceptional testimonials. Will go anywhere. Address, MINERO, Mining and Metallurgical Journal Office.

MINING MEN, business men and pleasure-seekers, given prompt attention and good service. Daily stage operated to and from Helvetia. BARKLEY BROS., Proprietors the Tucson Stables, corner Congress St. and Sixth Ave., Tucson.

FOR SALE

FOR SALE.—Near Birmingham, Ala., a rich iron mine. Brown hematite ore 26-foot vein, average 65 per cent. Also fine vein of silver and copper. For full particulars, address G. W. WRIGHT, Grosebeck, Texas.

Mines in San Bartolo District, Pacific Coast, Tepic, Mexico. To Actual Investors Only.—For Sale.

A GROUP of very promising lode claims with considerable workings upon them, but caved in. Any amount of ore in sight. Low grade ore. Assays show, gold, 1 ounce; silver, 30 ounces, to the ton. Water power and timber close to the mines. Write for particulars to LIC. ELIAS GALINDO, Tepic, Mexico, P. O. B. 26.

COPPER claim for sale. Vein 30 feet wide, averages 15 per cent copper and $12 gold per ton. Will sell on easy terms, or bond to responsible parties. Unencumbered, and not in litigation. MRS. FRANK RYLAND, Wickenburg, Ariz.

A LARGE Gold deposit. Will average $16.00 free gold suitable for Cyanide process. Twelve miles from railroad, in Arizona. Terms reasonable.
H. P. DURRELL,
El Paso, Texas.

TREMAIN Two-Stamp Steam Mill at Tucson, Arizona. 15-HP. Boiler Pump, and everything complete, set up ready for work. In excellent condition; used less than six months. Address, DREDGING MINING MACHINERY CO., Kansas City, Mo.

PENNSYLVANIA COAL LAND FOR SALE.—20,000 acres within 18 miles of Pittsburg, on river and rail. Vein six to seven feet. All mine openings would be self-draining. Full description furnished. SAMUEL BORDENKIRCHER, 76 Hillsdale Ave, Cleveland, O.

FOR SALE—Manganese—An immense deposit of high-grade manganese ore; close to S. P. R. R., and but a few miles from the Pacific Coast R. R., which connects with Port Harford, where large vessels can enter. Address
Box 20, San Luis Obispo, Cal.

230 ACRES of patented land in one of the richest localities in California for $5,000. It is quartz property, can be worked by tunnels. Has plenty free timber; cheap water. Three miles from railroad. This is a bargain. Address
Box 209, Placerville, California.

COAL LANDS FOR SALE CHEAP.—10,000 acres best coal land in Westmoreland County, Pa., convenient to water and railroad. Three openings already made. Particulars upon application. SAM'L BORDENKIRCHER, 76 Hillsdale Ave., Cleveland, O.

MINES in Tatepuzco District, For Sale, Lease or Bond.—Five old mines, forming group with 1,000 tons of ore in the dumps. Concentrating ore, averaging 30 ozs. silver and ½ oz. to the ton; lead, 30%; iron, 13%; zinc, 12%. Lands suitable for raising live stock; 40,000 acres, with water and timber rights. Reports and maps sent on application. Address, LIC ELIAS GALINDO, Tepic, Mexico, P. O. B. No. 26.

A PROMISING group of copper mines, located 14 miles from Tucson, Pima County, Arizona. For particulars apply to W. S. NEFF, 137 S. Fourth Ave., Tucson, Ariz.

MINES FOR SALE; or will purchase and explore mines. Knowledge of mining in Mexico. CHARLES VON ERXLEBEN, Civil and Mining Engineer, U. S. Deputy Mineral Surveyor, Tucson, Ariz.

THE UNITED MINES MINING CO.

is a corporation organized under the laws of the State of Delaware, with an authorized capital stock of $400,000; par value, $1.00 per share; non-assessable and no personal liability of shareholders. Principal office at Wilmington, Delaware, with Delaware Charter Guarantee & Trust Co., and branch executive office at Santa Ana, Orange county, California. At par value 180,000 shares of this stock are issued for mines and oil lands, equipment and supplies. The balance, 220,000 shares, is being sold at par value for cash. Subscriptions for these shares (one or many) can now be made and paid for at par, $1.00 per share, all down, or in advance installments of not less than 10% per month. The certificates are issued to subscribers when fully paid. The cash thus received will be used in the furtherance of the Company's interests and the prosecution of its business affairs. The properties will be rapidly and thoroughly developed and energetically operated so as to produce the best results for the shareholders. The production of gold, copper, lead and silver ores and oil, as well as any other businessas co-incident therewith will be vigorously handled. This is a good healthy enterprise, with excellent propositions in hand for immediate operations. Your correspondence and patronage are requested. In your remittances send Post Office Money Orders or drafts on New York City banks, payable to the United Mines Mining Co., and address all correspondence to GILES OTIS PEARCE, General Manager, Santa Ana, Orange County, California.

BUYERS' GUIDE

Our Buyers' Guide is arranged to assist those who expect to purchase machinery and supplies to find quickly and easily the addresses of the leading dealers. A postal card addressed to this paper will bring you the catalogues of all houses named under any classification.

AIR COMPRESSORS
Edw P Allis Co, Milwaukee, Wis
M C Bullock Mfg Co, Chicago, Ill
Colorado Iron Wks, Denver, Colo
W H Emanuel, Denver, Colo
Fairbanks, Morse & Co, Chicago, Ill
Gates Iron Works, Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Ingersoll-Sergeant Drill Co, N Y City
Parke & Lacy Co, S Francisco, Cal
Willis Shaw, Chicago, Ill
Sullivan Machinery Co, Chicago, Ill
Union Gas Engine Co, S Francisco, Cal
Weber Gas & Gasoline Eng Co, Kansas City, Mo
J Wigmore & Sons Co, Los Angeles, Cal

AMALGAM PLATES
Edw P Allis Co, Milwaukee, Wis
E G Denniston, S Francisco, Cal
Joshua Hendy Machine Wks, S Francisco, Cal
San Francisco Novelty & Plating Wks, S Francisco, Cal
John Taylor & Co, S Francisco, Cal

ARC DYNAMOS
W H Emanuel, Denver, Colo

ASSAYERS AND CHEMISTS
W O Abbott, Tombstone, Ariz
Lew E Aubury, Los Angeles, Cal
Baker & Co, N Y City and Newark, N J
F E Burlingame & Co, Denver, Colo
Bailly & Monnig, Denver, Colo
Wm M Courtis, Detroit, Mich
Louis Falkenau, S Francisco, Cal
Hamlin & Morrison, Philadelphia, Pa
A. A. Hanks, S Francisco, Cal
Clarence Hersey, Leadville, Colo
Ogden Assay Co, Denver, Colo
R A Perez, Los Angeles, Cal
John T Reed, San Bernardino, Cal
D W Reckhart, El Paso, Tex
Ricketts & Banks, N Y City
Selby Smelting & Lead Co, S Francisco, Cal
Ernest H. Simonds, S Francisco, Cal
Simonds & Wainwright, N Y City
State Ore Sampling Works, Denver, Colo
Wade & Wade, Los Angeles, Cal
Henry E Wood Denver, Colo

ASSAYERS' SUPPLIES
Wm Ainsworth & Sons, Denver, Colo
Baker & Adamson Chemical C Easton, Pa
Baker & Co, N Y City and Newark, N J
F W Braun & Co, Los Angeles, Cal
Denver Fire Clay Co, Denver, Colo
Queen & Co, Philadelphia, Pa
Richards & Co., Ltd, N Y City
Roessler & Hasslacher Chemical Co, N Y City
Smith & Thompson, Denver, Colo
John Taylor & Co, S Francisco, Cal
Henry Troemner, Philadelphia, Pa
Western Chemical Co. Denver, Colo

BABBITT METAL
Joshua Hendy Machine Wks, S Francisco, Cal

BAR IRON AND STEEL
J Wigmore & Sons Co, Los Angeles, Cal

BANKERS AND BROKERS
Lytle & Co, Galena, Kan
Morgan-Watson Mining & Construction Co Cleveland, O

BELT DRESSING
Jos Dixon Crucible Co, Jersey City, N J

BELTING
Edw P Allis Co, Milwaukee, Wis
Gutta Percha & Rubber Mfg Co, S Francisco, Cal
Goodyear Rubber Co, S Francisco, Cal
Joshua Hendy Machine Wks, S Francisco, Cal
Jeffrey Mfg Co, Columbus, O
Link-Belt Machinery Co, Chicago, Ill
Robins' Conveying Belt Co, N Y City
Shultz Belting Co, St Louis, Mo
S S Machinery Co, Denver, Colo
J Wigmore & Sons Co, Los Angeles Cal

BLACK DIAMONDS
Theo Lexow, N Y City
I C Yawger, N Y City

BLASTING BATTERIES, ETC.
Metallic Cap Mfg Co, N Y City
J Wigmore & Sons Co, Los Angeles, Cal

BOILERS
Edw P Allis Co, Milwaukee, Wis
California Anti-Calorie Co, S Francisco, Cal
Colorado Iron Works, Denver, Colo
Fairbanks, Morse & Co Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Jas Loffel & Co, Springfield, O
Lidgerwood Mfg Co, N Y City
Chas C Moore & Co, S Francisco, Cal
Murray Iron Works, Burlington, Iowa
Ruggles-Coles Engineering Co, N Y City
S S Machinery Co, Denver, Colo
Wm B Scaife & Sons, Pittsburg, Pa
J Wigmore & Sons Co, Los Angeles, Cal

BOILER COMPOUNDS
Geo W Lord, Philadelphia, Pa

BOILER COVERING
California Anti-Calorie Co, S Francisco, Cal

BOILER TUBE CLEANERS
Coggeshall Mfg Co, N Y City

BOOKS
Mining & Metallurgical Journal, N Y City
Philadelphia Book Co, Philadelphia, Pa
D. Van Nostrand Co, N Y City

BRASS GOODS
American Injector Co, Detroit, Mich
Joshua Hendy Machine Wks, S Francisco, Cal

BUCKETS
Joshua Hendy Machine Wks, S Francisco, Cal
Jeffrey Mfg Co, Columbus, O
Link-Belt Machinery Co, Chicago, Ill
Thomson & Boyle, Los Angeles, Cal
Weber Gas & Gasoline Eng Co, Kansas City, Mo
J Wigmore & Sons Co Los Angeles, Cal

CAP CRIMPERS
Metallic Cap Mfg Co, N Y City

CARBONS
American Diamond Rock Drill Co. N Y City
M C Bullock Mfg Co, Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Theo Lexow, N Y City

CARS (DUMP and MINE)
Edw P Allis Co, Milwaukee, Wis
M C Bullock Mfg Co, Chicago, Ill
Colorado Iron Works, Denver, Colo
Fairbanks, Morse & Co, Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Thomson & Boyle, Los Angeles, Cal
Weber Gas & Gasoline Eng Co, Kansas City, Mo
J Wigmore & Sons Co, Los Angeles, Cal

CASTINGS
Chrome Steel Wks, Brooklyn, N Y
Joshua Hendy Machine Wks, S Francisco, Cal
Jas Loffel & Co, Springfield, O
Ruggles-Coles Engineering Co, N Y City
Sullivan Machinery Co, Chicago, Ill
I C Yawger, N Y City

CHEMICALS
Baker & Adamson Chemical Co, Easton, Pa
F W Braun & Co, Los Angeles, Cal
Denver Fire Clay Co, Denver, Colo
Richards & Co., Ltd, N Y City
Roessler & Hasslacher Chemical Co, N Y City
John Taylor & Co, S Francisco, Cal
Western Chemical Co. Denver, Colo

COAL CRUSHERS
Link-Belt Machinery Co, Chicago, Ill
Williams Patent Crusher & Pulverizer Co, St Louis, Mo.

COAL CUTTERS
Ingersoll-Sergeant Drill Co, N Y City
Jeffrey Mfg Co, Columbus, O
Link-Belt Machinery Co, Chicago, Ill
Sullivan Machinery Co, Chicago, Ill

COAL-HANDLING MACHINERY
M C Bullock Mfg Co, Chicago, Ill
Jeffrey Mfg Co, Columbus, O
Link-Belt Machinery Co, Chicago, Ill
Robins Conveying Belt Co, N Y City
S S Machinery Co, Denver, Colo
Trenton Iron Co, Trenton, N J

CONCENTRATORS, CRUSHERS, ETC.
Edw P Allis Co, Milwaukee, Wis
Bradley Pulverizer Co, Boston, Mass
F W Braun & Co, Los Angeles, Cal
Frue Vanning Machine Co, S Francisco, Cal
Gates Iron Works, Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Link-Belt Machinery Co, Chicago, Ill
New Standard Co, Los Angeles, Cal
Willis Shaw, Chicago, Ill
S S Machinery Co, Denver, Colo
John Taylor & Co, S Francisco, Cal
J Wigmore & Sons Co, Los Angeles, Cal
Williams Patent Crusher & Pulverizer Co, St Louis, Mo
Woodbury Concentrator, S Francisco, Cal

CONVEYING MACHINERY
California Wire Works, S Francisco, Cal
Colorado Iron Wks, Denver, Colo
W H Emanuel, Denver, Colo
Adolf Feron, Los Angeles, Cal
Joshua Hendy Machine Wks, S Francisco, Cal
Jeffrey Mfg Co, Columbus, O
Lidgerwood Mfg Co, N Y City
Link-Belt Machinery Co, Chicago, Ill
Robins Conveying Belt Co, N Y City
Trenton Iron Co, Trenton, N J

COPPER DEALERS
Montana Ore Purchasing Co, N Y City
State Ore Sampling Co, Denver, Colo

CRUCIBLES
F W Braun & Co, Los Angeles, Cal
Denver Fire Clay Co, Denver, Colo
Jos Dixon Crucible Co, Jersey City, N J
John Taylor & Co, S Francisco, Cal

(Continued on page XI.)

BUYERS' GUIDE—Continued.

CUPEL MACHINES
F W Braun & Co. — Los Angeles, Cal

CYANIDE
F W Braun & Co. — Los Angeles, Cal
Rossaler & Hasslacher Chemical Co. — N Y City
John Taylor & Co. — S Francisco, Cal

CYANIDE PLANTS
Thomson & Boyle, — Los Angeles, Cal

DIAMONDS
American Diamond Rock Drill Co. — N Y City
M C Bullock, Mfg Co. — Chicago, Ill
Theo Lexow, — N Y City
Sullivan Machinery Co, — Chicago, Ill
I C Yawger, — N Y City

DIAMOND DRILLS
American Diamond Rock Drill Co, — N Y City
M C Bullock Mfg Co, — Chicago, Ill
Joshua Hendy Machine Wks, — S Francisco, Cal
Sullivan Machinery Co. — Chicago, Ill

DIAMOND DRILL DIAMONDS
Theo Lexow, — N Y City
I C Yawger, — N Y City

DRAWING MATERIALS
F E Brandis, Sons & Co, — Brooklyn, N Y
Eugene Dietzgen Co, — Chicago, Ill
Jos Dixon Crucible Co, — Jersey City, N J
Adolf Frese, — Los Angeles, Cal
F C Knight & Co, — Philadelphia, Pa
L Manasse Co. — Chicago, Ill
Queen & Co, — Philadelphia, Pa
F Weber & Co. — Philadelphia, Pa

DREDGING MACHINERY
Joshua Hendy Machine Wks, — S Francisco, Cal
Jeffrey Mfg Co, — Columbus, O
Lidgerwood Mfg Co, — N Y City
Robins Conveying Belt Co, — N Y City
Weber Gas & Gasoline Eng Co, — Kansas City, Mo

DRILLS (ROCK)
Edw P Allis Co — Milwaukee, Wis
American Diamond Rock Drill Co, — N Y City
M C Bullock Mfg Co, — Chicago, Ill
W H Emanuel, — Denver, Colo
Joshua Hendy Machine Wks, — S Francisco, Cal
Howells Mining Drill Co, — Plymouth, Pa
Ingersoll-Sergeant Drill Co, — N Y City
Willis Shaw, — Chicago, Ill
Sullivan Machinery Co, — Chicago, Ill
J Wigmore & Sons Co, — Los Angeles, Cal

DRILL STEEL
M C Bullock Mfg Co, — Chicago, Ill
Joshua Hendy Machine Wks, — S Francisco, Cal
Ingersoll-Sergeant Drill Co, — N Y City
J Wigmore & Sons Co, — Los Angeles, Cal

DRYERS
Colorado Iron Wks, — Denver, Colo
F D Cummer & Sons Co, — Cleveland, O
Joshua Hendy Machine Wks, — S Francisco, Cal
Ruggles-Coles Engineering Co, — N Y City

DRY WASHERS
A G Godfrey, — Los Angeles, Cal

DUMP CARS
Edw P Allis Co, — Milwaukee, Wis
M C Bullock Mfg Co, — Chicago, Ill
Colorado Iron Wks, — Denver, Colo
Fairbanks, Morse & Co, — Chicago, Ill
Joshua Hendy Machine Wks, — S Francisco, Cal
Willis Shaw, — Chicago, Ill
Thomson & Boyle, — Los Angeles, Cal
Trenton Iron Co, — Trenton, N J
Weber Gas & Gasoline Eng Co, — Kansas City, Mo
J Wigmore & Sons Co, — Los Angeles, Cal

ELECTRICAL SUPPLIES
American Impulse Wheel Co, — N Y City
Joshua Hendy Machine Wks, — S Francisco, Cal
Jeffrey Mfg. Co, — Columbus, O
John Taylor & Co. — S Francisco, Cal

ELECTRIC HOISTS
Lidgerwood Mfg Co, — N Y City
Link-Belt Machinery Co, — Chicago, Ill

ELEVATORS (CONVEYORS)
Colorado Iron Wks, — Denver, Colo
Joshua Hendy Machine Wks, — S Francisco, Cal
Jeffrey Mfg. Co, — Columbus, O
Link-Belt Machinery Co, — Chicago, Ill
Robins Conveying Belt Co, — N Y City
S S Machinery Co, — Denver, Colo
J Wigmore & Sons Co. — Los Angeles, Cal

ENGINES
Edw P Allis Co, — Milwaukee, Wis
M C Bullock Mfg Co, — Chicago, Ill
Jeffrey Mfg Co, — Columbus, O
Jas Leffel & Co, — Springfield, O
Chas C Moore & Co. — S Francisco, Cal
Murray Iron Works Co, — Burlington, Ia
Oriental Gas Engine Co, — S Francisco, Cal
S S Machinery Co. — Denver, Colo
Union Gas Engine Co, — S Francisco, Cal
Weber Gas & Gasoline Eng Co, — Kansas City, Mo
J Wigmore & Sons Co. — Los Angeles, Cal

ENGINEERS' INSTRUMENTS
Theo Alteneder & Sons. — Philadelphia, Pa
C L Berger & Sons, — Boston, Mass
F E Brandis Sons & Co. — Brooklyn, N Y
F W Braun & Co. — Los Angeles, Cal
E Dietzgen Co, — Chicago, Ill
Adolf Frese, — Los Angeles, Cal
F C Knight & Co, — Philadelphia, Pa
Lufkin Rule Co., — Saginaw, Mich

L Manasse Co. — Chicago, Ill
Queen & Co, — Philadelphia, Pa
F Weber & Co. — Philadelphia, Pa

EXPLOSIVES
Metallic Cap Mfg Co, — N Y City
J Wigmore & Sons Co. — Los Angeles, Cal

FEED WATER HEATERS
Benj F Kelley & Son, — N Y City
Frank L Patterson, — N Y City

FILTER PAPERS
Baker & Adamson Chemical Co — Easton, Pa
F W Braun & Co. — Los Angeles, Cal
Rossaler & Hasslacher Chemical Co, — N Y City
Western Chemical Co — Denver, Colo

FIRE BRICKS AND CLAY
Los Angeles, Cal
Denver Fire Clay Co, — Denver, Colo
John Taylor & Co. — S Francisco, Cal

FORGINGS.
Fulton Engine Wks, — Los Angeles, Cal
Joshua Hendy Machine Wks, — S Francisco, Cal
Hooven Gas Engine Wks, — S Francisco, Cal

FURNACES
F W Braun & Co. — Los Angeles, Cal
Colorado Iron Wks, — Denver, Colo
Joshua Hendy Machine Wks, — S Francisco, Cal
Wm Hoskins, — Chicago, Ill
John Taylor & Co. — S Francisco, Cal

GAS ENGINES
Lambert & Morse Agency — Chicago, Ill
Joshua Hendy Machine Wks, — S Francisco, Cal
Hercules Gas Engine Co — S Francisco, Cal
Oriental Gas Engine Co, — S Francisco, Cal
S S Machinery Co — Denver, Colo
Union Gas Engine Co — S Francisco, Cal
Weber Gas & Gasoline Eng Co, — Kansas City, Mo
J Wigmore & Sons Co, — Los Angeles, Cal

GASOLINE ENGINES AND HOISTS
Union Gas Engine Co, — S Francisco, Cal
Weber Gas & Gasoline Eng Co, — Kansas City, Mo

(Continued on page XI)

BUYERS' GUIDE (Continued).

ENGINES
Edw P Allis Co, Milwaukee, Wis
Joshua Hendy Machine Wks, S Francisco, Ca.
Hercules Gas Engine Wks, S Francisco, Cal
Jas Leffel & Co, Springfield, O
Link-Belt Machinery Co, Chicago, Ill
J Wigmore & Sons Co, Los Angeles, Cal
Henshaw, Bulkley & Co, S Francisco, Cal

GOLD WASHERS
A G Godfrey, Los Angeles, Cal
Russell & Kinsey, Los Angeles, Cal

GREASE, GRAPHITE, ETC.
Adam Cook's Sons, N Y City
Jos Dixon Crucible Co, Jersey City, N J
Joshua Hendy Machine Wks, S Francisco, Cal

GREASE AND OIL CUPS
American Injector Co, Detroit, Mich

GRIZZLY PLATES
Robt Aitchison Perforated Metal Co, Chicago, Ill

HOISTING MACHINERY
Edw P Allis Co, Milwaukee, Wis
M C Bullock Mfg Co, Chicago, Ill
Colorado Iron Wks, Denver, Colo
W H Emanuel, Denver, Colo
Fairbanks, Morse & Co, Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Jeffrey Mfg Co, Columbus, O
Lidgerwood Mfg Co, N Y City
Link-Belt Machinery Co, Chicago, Ill
Murray Iron Works Co, Burlington, Ia
S S Machinery Co, Denver, Colo
Trenton Iron Co, Trenton, N J
Union Gas Engine Co, S Francisco, Cal
Weber Gas & Gasoline Eng Co, Kansas City, Mo
J Wigmore & Sons Co, Los Angeles, Cal

HYDRAULIC MACHINERY
American Impulse Wheel Co, N Y City
W H Emanuel, Denver, Colo
Joshua Hendy Machine Wks, S Francisco, Cal
Jas Leffel & Co, Springfield, O
Weber Gas & Gasoline Eng Co, Kansas City, Mo

INJECTORS
American Injector Co, Detroit, Mich

INSULATED WIRES
Joshua Hendy Machine Wks, S Francisco, Cal
John Taylor & Co, S Francisco, Cal

LAWYERS
Harlow Mining Agency, Nogales, Ariz

LINK BELTING
Joshua Hendy Machine Wks, S Francisco, Cal
Link-Belt Machinery Co, Chicago, Ill
Taylor Iron and Steel Co, High Bridge, N J
J Wigmore & Sons Co, Los Angeles, Cal

MACHINERY (GENERAL)
Abendroth & Root, N Y City
American Diamond Rock Drill Co, N Y City
American Impulse Wheel Co, N Y City
M C Bullock Mfg Co, Chicago, Ill
Colorado Iron Wks, Denver, Colo
D. Campbell Davies & Co, Durango, Mex
W H Emanuel, Denver, Colo
Fairbanks, Morse & Co, Chicago, Ill
Fulton Engine Wks, Los Angeles, Cal
Gates Iron Works, Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Jackson Drill & Mfg Co, Denver, Colo
Jeffrey Mfg Co, Columbus, O
Benj F Kelley & Son, N Y City
Link-Belt Machinery Co, Chicago, Ill
Chas C Moore & Co, S Francisco, Cal
Murray Iron Works Co, Burlington, Ia
Ruggles-Coles Engineering Co, N Y City
Wallis Shaw, Chicago, Ill
S S Machinery Co, Denver, Colo
Scott Supply & Tool Co, Denver, Colo
Sullivan Machinery Co, Chicago, Ill
Walsh's Sons & Co, Newark, N J
Weber Gas & Gasoline Eng Co, Kansas City, Mo
J Wigmore & Sons Co, Los Angeles, Cal

MANGANESE STEEL
Taylor Iron & Steel Co, High Bridge, N J

METAL DEALERS
Baker & Co, N Y City and Newark, N J
Johnson, Matthey & Co, London, Eng
D W Reckhart, El Paso, Tex
State Ore Sample Wks, Denver, Colo

METALLURGICAL WORKS
Lew E Aubury, Los Angeles, Cal
Gold & Silver Extraction Co, Denver, Colo
G G McNamara, Florence, Ariz
Montana Ore Purchasing Co, N Y City
R A Perez, Los Angeles, Cal
Ricketts & Banks, N Y City
Selby Smelting & Lead Co, S Francisco, Cal
State Ore Sample Wks, Denver, Colo
Wade & Wade, Los Angeles, Cal

MINE CARS
M C Bullock Mfg Co, Chicago, Ill
Colorado Iron Wks, Denver, Colo
Fairbanks, Morse & Co, Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Jeffrey Mfg Co, Columbus O
Link-Belt Machinery Co, Chicago, Ill
C. J. Tallon, S Francisco, Cal
Thomson & Boyle, Los Angeles, Cal
Weber Gas & Gasoline Eng Co, Kansas City, Mo
J Wigmore & Sons Co, Los Angeles, Cal

MINERAL SPECIMENS
Roy Hopping, N Y City

MINING COMPANIES
Lic Elias Galindo, Tepic, Mex
Lytle & Co, Galena, Kans
Montana Ore Purchasing Co, N Y City
Morgan-Watson Mining & Construction Co, Cleveland, O

MINING ENGINEERS
Lew E Aubury, Los Angeles, Cal
John A Church, N Y City
Edward S Cobb, S Francisco, Cal
Wm M Courtis, Detroit, Mich
Chas. L. Dignowity, Boston, Mass
Harlow Mining Agency Nogales, Ariz
C W Kempton, N Y City
M. H. Lyon, Joplin, Mo
J W McCoy, Chicago, Ill
P. B. McCoy, N Y City
G G McNamara, Boise, Ida
J. F Milner, Los Angeles, Cal
R A Perez, Los Angeles, Cal
D W Reckhart, El Paso, Tex
J E Sexton, Placerville, Cal
Simonds & Wainwright, N Y City
Theo F Van Wagenen Denver, Colo

OIL WELL MACHINERY
Keystone Driller Co. Beaver Falls, Pa

ORE PURCHASING COMPANIES
Baker & Co, N Y City and Newark, N J
Gold & Silver Extraction Co, Denver, Colo
Montana Ore Purchasing Co, N Y City
Ogden Assay Co, Denver, Colo
Selby Smelting & Lead Co, S Francisco, Cal
State Ore Sampling Wks, Denver, Colo

ORE TESTING COMPANIES
L E Aubury, Los Angeles, Cal
Gold & Silver Extraction Co, Denver, Colo
Montana Ore Purchasing Co. N Y City
R A Perez, Los Angeles, Cal
Ricketts & Banks, N Y City
State Ore Sampling Wks, Denver, Colo
Wade & Wade, Los Angeles, Cal

PACKING
Adam Cook's Sons, N Y City
Duval Metallic Packing Co., N Y City
Goodyear Rubber Co, S Francisco, Cal
Joshua Hendy Machine Wks, S Francisco, Cal

PATENTS
C H M y Agramonte, Mexico City, Mex
Townsend Bros, Los Angeles, Cal

PERFORATED METALS
Robt Aitchison Perforated Metal Co, Chicago, Ill
Edw P Allis Co, Milwaukee, Wis
Cal Perforating Screen Co, S Francisco, Cal
Estey Wire Works, N Y City
Joshua Hendy Machine Wks, S Francisco, Cal
San Francisco Pioneer Screen Wks, S Francisco, Cal

PICKING TABLES
Link-Belt Machinery Co, Chicago, Ill

PILE DRIVERS
Ingersoll-Sergeant Drill Co, N Y City
Lidgerwood Mfg Co. N Y City
Weber Gas & Gasoline Eng Co, Kansas City, Mo

PIPES
Abendroth & Root, N Y City
Asphalt Paper Pipe Co, Los Angeles, Cal
Joshua Hendy Machine Wks, S Francisco, Cal
Wm B Scaife & Sons, Pittsburg, Pa
Francis Smith & Co, S Francisco, Cal
S S Machinery Co, Denver, Colo
Thomson & Boyle, Los Angeles, Cal

PLATE IRON AND STEEL
Wm B Scaife & Sons, Pittsburg, Pa
Francis Smith & Co, S Francisco, Cal

PLATINUM
Baker & Co, N Y City and Newark, N J
Johnson, Matthey & Co, London, Eng

PULVERIZERS
Bradley Pulverizer Co, Boston, Mass
Colorado Iron Wks, Denver, Colo
Gates Iron Works, Chicago, Ill
Jeffrey Mfg. Co, Columbus, O
Williams Patent Crusher & Pulverizer Co, St Louis, Mo

(Continued on page XIII.)

BUYERS' GUIDE (Continued)

PUMPS
American Injector Co., Detroit, Mich
Geo Dow Pumping Engine Co., S Francisco, Cal
W H Emanuel, Denver, Colo
Fairbanks, Morse & Co., Chicago, Ill
Joshua Hendy Machine Wks, S Francisco, Cal
Benj F Kelley & Son, N Y City
Link-Belt Machinery Co., Chicago, Ill
Chas C Moore & Co., S Francisco, Cal
Pulsometer Steam Pump Co., N Y City
S S Machinery Co., Denver, Colo
Weber Gas & Gasoline Eng Co., Kansas City, Mo
J Wigmore & Sons Co., Los Angeles, Cal

POWDER
California Vigorit Powder Co., S Francisco, Cal
J Wigmore & Sons Co., Los Angeles, Cal

PUMPS (HAND)
Abendroth & Root, N Y City

QUARRYING MACHINES
W H Emanuel Denver, Colo
Sullivan Machinery Co., Chicago, Ill

RAILROADS
Santa Fe Route, S Francisco, Cal
Southern Pacific Co. Los Angeles, Cal

RAILS
C. J. Tallon, S Francisco, Cal

ROOFING
Paraffine Paint Co. Los Angeles, Cal
Wm B Scaife & Sons, Pittsburg, Pa
Warren Chemical & Mfg Co. N Y City

SCALES AND BALANCES
Wm Ainsworth & Sons, Denver, Colo
F W Braun & Co, Los Angeles, Cal
Denver Fire Clay Co, Denver, Colo
Adolf Frese, Los Angeles, Cal
L Manasse Co, Chicago, Ill
Queen & Co, Philadelphia, Pa
Richards & Co., Ltd, N Y City
Smith & Thompson, Denver, Colo
Henry Troemner, Philadelphia, Pa

SCHOOLS AND COLLEGES
Heald's Business College, S Francisco, Cal
Michigan College of Mines, Houghton, Mich
Van Der Naillen School, S Francisco, Cal

SCREENS
Robt Aitchison Perforated Metal Co, Chicago, Ill
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